TEST REPORT

Applicant: **Autel Robotics Co.,Ltd.**

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FCC ID: **2AGNTMDA2409A**

IC: **20910-MDA2409A**

HVIN: **MDA,MDA2**

Product Name: **EVO Nano,EVO Nano+**

Standard(s): **47 CFR Part 15, Subpart E(15.407)**
RSS-247 Issue 2, February 2017
RSS-Gen, Issue 5, February 2021 Amendment 2
ANSI C63.10-2013
KDB 789033 D02 General U-NII Test Procedures New Rules v02r01

The above equipment has been tested and found compliance with the requirement of the relative standards by China Certification ICT Co., Ltd (Dongguan)

Report Number: **CR21090094-00B**

Date Of Issue: **2021-11-11**

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Test Facility

The Test site used by China Certification ICT Co., Ltd (Dongguan) to collect test data is located on the No. 113, Pingkang Road, Dalang Town, Dongguan, Guangdong, China.

The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 442868, the FCC Designation No. : CN1314.

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier: CN0123.

Declarations

China Certification ICT Co., Ltd (Dongguan) is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with a triangle symbol "▲". Customer model name, addresses, names, trademarks etc. are not considered data.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

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1. GENERAL INFORMATION

1.1 Product Description for Equipment under Test (EUT)

EUT Name:	EVO Nano,EVO Nano+
EUT Model:	MDA
Multiple Model:	MDA2
Operation Frequency:	1.4MHz SRD Mode:5154-5246 MHz, 5728-5847 MHz 10 MHz SRD Mode:5157-5243 MHz, 5733-5842 MHz 20 MHz SRD Mode:5167-5233 MHz, 5738-5839 MHz 802.11n ht40/ac vht40:5190-5230 MHz, 5755-5795 MHz 802.11ac vht80: 5210 MHz, 5775 MHz
Maximum Peak Output Power (Conducted):	SRD: 12.88 dBm (5150-5250 MHz), 23.34dBm(5725-5850 MHz) Wi-Fi: 7.26 dBm (5150-5250 MHz), 6.88dBm(5725-5850 MHz)
Modulation Type:	OFDM
Rated Input Voltage:	DC 7.7V from battery
Serial Number:	CR21090094-RF-S4
EUT Received Date:	2021.09.28
EUT Received Status:	Good
Note: The Multiple models are identical with Test model, please refer to the declaration letter for more detail, which was provided by manufacturer.	

Operation Frequency Detail:

For 1.4MHz mode:

5150-5250MHz Band		5725-5850MHz Band	
Channel	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**
1	5154	1	5728
2	5155	2	5729
…	…	…	…
…	…	…	…
46	5200	59	5787
47	5201	60	5788
…	…	…	…
…	…	…	…
92	5245	119	5846
93	5246	120	5847
Note: 5150-5250 MHz band only enabled in US market, disabled in Canada market.			

Per section 15.31(m), the lowest frequency, middle frequency, and highest frequency were performed the test as below:

Test Channel	Test Frequency (MHz)	
	5150-5250MHz Band	**5725-5850MHz Band**
Lowest	5154	5728
Middle	5201	5789
Highest	5246	5847

For 10MHz mode:

5150-5250MHz Band		5725-5850MHz Band	
Channel	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**
1	5157	1	5733
2	5158	2	5734
…	…	…	…
…	…	…	…
43	5200	54	5787
44	5201	55	5788
…	…	…	…
…	…	…	…
86	5242	109	5841
87	5243	110	5842
Note: 5150-5250 MHz band only enabled in US market, disabled in Canada market.			

Per section 15.31(m), the lowest frequency, middle frequency, and highest frequency were performed the test as below:

Test Channel	Test Frequency (MHz)	
	5150-5250MHz Band	5725-5850MHz Band
Lowest	5157	5733
Middle	5201	5789
Highest	5243	5842

For 20MHz mode:

5150-5250MHz Band		5725-5850MHz Band	
Channel	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**
1	5167	1	5738
2	5168	2	5739
…	…	…	…
…	…	…	…
43	5200	50	5788
44	5201	51	5789
…	…	…	…
…	…	…	…
66	5232	101	5838
67	5233	102	5839
Note: 5150-5250 MHz band only enabled in US market, disabled in Canada market.			

Per section 15.31(m), the lowest frequency, middle frequency, and highest frequency were performed the test as below:

Test Channel	Test Frequency (MHz)	
	5150-5250MHz Band	5725-5850MHz Band
Lowest	5167	5738
Middle	5201	5790
Highest	5233	5839

For 802.11n ht40 and 802.11ac vht40:

5150-5250MHz		5725-5850MHz	
Channel	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**
38	5190	151	5755
46	5230	159	5795
Note: the 802.11ac vht40 were reduced since it is identical parameters with 802.11n ht40. 5150-5250 MHz band only enabled in US market, disabled in Canada market.			

Per section 15.31(m), frequency were performed the test as below:

Test Channel	Test Frequency (MHz)	
	5150-5250MHz Band	**5725-5850MHz Band**
Lowest	5190	5755
Highest	5230	5795

For 802.11ac vht80:

5150-5250MHz Band		5725-5850MHz Band	
Channel	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**
42	5210	155	5775
Note: 5150-5250 MHz band only enabled in US market, disabled in Canada market.			

Per section 15.31(m), frequency were performed the test as below:

Test Channel	Test Frequency (MHz)	
	5150-5250MHz Band	**5725-5850MHz Band**
Middle	5210	5775

Antenna Information Detail▲:

Antenna Manufacturer	Antenna Type	input impedance (Ohm)	Antenna Gain /Frequency Range	§15.203& RSS-Gen Requirement
Autel Robotics Co.,Ltd.	FPC	50	2.1dBi/ 5.15~5.85GHz	**Compliance**
The Method of §15.203 Compliance: ☒Antenna must be permanently attached to the unit. ☐Antenna must use a unique type of connector to attach to the EUT. ☐Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.				

Accessory Information:

Accessory Description	Manufacturer	Model	Parameters
USB-A Cable	Unknown	Unknown	Shielded, 1.0m
USB-C Cable	Unknown	Unknown	Shielded, 1.0m
Adapter	Dongguan XuYuan Electronic Technology Co., Ltd	XY-PD030T02	Input: 100~240V, 50/60Hz 1A MAX Output: USB-C: DC5V 3A DC 9V3A DC 12V 2.5A USB-A: DC 5V 3A DC 9V 2A DC 12V 1.5A USB-C+USB-A: DC 5V 3.1A

1.2 Description of Test Configuration

1.2.1 EUT Operation Condition:

EUT Operation Mode:	The system was configured for testing in Engineering Mode, which was provided by the manufacturer.
Equipment Modifications:	No
EUT Exercise Software:	RRTL6.0.0_VCOM

The software " RRTL6.0.0_VCOM "was provided by manufacturer. The maximum power was configured as below, that was provided by the manufacturer▲:

Frequency Band	Test Modes	Data Rate	Power Level Setting		
			Lowest Channel	Middle Channel	Highest Channel
5150-5250 MHz	1.4M	1 Mbps	64	40	36
	10M	25 Mbps	64	40	36
	20M	50 Mbps	64	40	36
	802.11n ht40	MCS0	28	/	28
	802.11ac vht80	MCS0	/	28	/
5725-5850 MHz	1.4M	1 Mbps	24	24	24
	10M	25 Mbps	24	24	24
	20M	50 Mbps	24	24	24
	802.11n ht40	MCS0	28	/	28
	802.11ac vht80	MCS0	/	28	/

The worst-case data rates are determined for each mode based upon investigations by measuring the average power and PSD across all data rates, bandwidths, and modulations.
The device supports SISO and MIMO for 1.4M/10M/20M modes, per pretest, MIMO was the worst mode and reported in this report.
802.11n/ac mode only transmit in Antenna Chain 0.

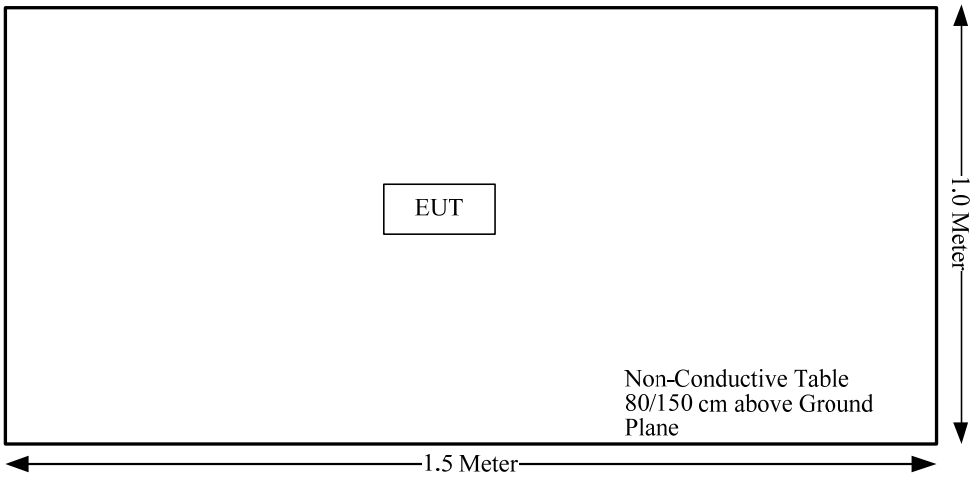
1.2.2 Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
/	/	/	/

1.2.3 Support Cable List and Details

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
/	/	/	/	/	/

1.2.4 Block Diagram of Test Setup



1.3 Measurement Uncertainty

Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.

Parameter	Measurement Uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±0.61dB
Power Spectral Density, conducted	±0.61 dB
Unwanted Emissions, radiated	30M~200MHz: 4.15 dB,200M~1GHz: 5.61 dB,1G~6GHz: 5.14 dB, 6G~18GHz: 5.93 dB,18G~26.5G:5.47 dB,26.5G~40G:5.63 dB
Unwanted Emissions, conducted	±1.26 dB
Temperature	±1℃
Humidity	±5%
DC and low frequency voltages	±0.4%
Duty Cycle	1%
AC Power Lines Conducted Emission	2.8 dB (150 kHz to 30 MHz)

2. SUMMARY OF TEST RESULTS

Standard(s) Section	Test Items	Result	Note
§15.207(a) RSS-Gen Clause 8.8	AC line conducted emissions	Not Applicable	The device was powered by battery when operating
FCC§15.205& §15.209 &§15.407(b) RSS-247 Clause 6.2	Undesirable Emission& Restricted Bands	Compliance	/
FCC§15.407(a) (e) RSS-247 Clause 6.2 RSS-Gen Clause 6.7	Emission Bandwidth	Compliance	/
FCC§15.407(a) RSS-247 Clause 6.2	Conducted Transmitter Output Power	Compliance	/
FCC§15.407 (a) RSS-247 Clause 6.2	Power Spectral Density	Compliance	/
§15.203	Antenna Requirement	Compliance	/
RSS-247 Clause 6.4	Additional requirements	Compliance	/
§15.247 (i) & §1.1310 & §2.1091	Maximum Permissible Exposure (MPE)	Compliance	/
RSS-102 Clause 2.5.2	Exemption Limits For Routine Evaluation-RF Exposure Evaluation	Compliance	/

3. REQUIREMENTS AND TEST PROCEDURES

3.1 AC Line Conducted Emissions

3.1.1 Applicable Standard

FCC§15.207(a).

(a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 µH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

	Conducted limit (dBµV)	
Frequency of emission (MHz)	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

(b) The limit shown in paragraph (a) of this section shall not apply to carrier current systems operating as intentional radiators on frequencies below 30 MHz. In lieu thereof, these carrier current systems shall be subject to the following standards:

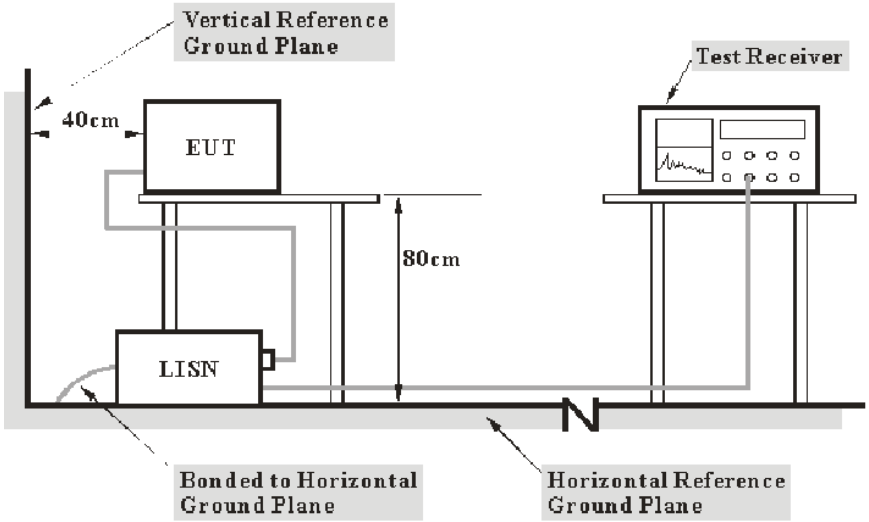
(1) For carrier current system containing their fundamental emission within the frequency band 535-1705 kHz and intended to be received using a standard AM broadcast receiver: no limit on conducted emissions.

(2) For all other carrier current systems: 1000 µV within the frequency band 535-1705 kHz, as measured using a 50 µH/50 ohms LISN.

(3) Carrier current systems operating below 30 MHz are also subject to the radiated emission limits in §15.205, §15.209, §15.221, §15.223, or §15.227, as appropriate.

(c) Measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines. Devices that include, or make provisions for, the use of battery chargers which permit operating while charging, AC adapters or battery eliminators or that connect to the AC power lines indirectly, obtainig their power through another device which is connected to the AC power lines, shall be tested to demonstrate compliance with the conducted limits.

3.1.2 EUT Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The spacing between the peripherals was 10 cm.

The adapter or EUT was connected to the main LISN with a 120 V/60 Hz AC power source.

3.1.3 EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

3.1.4 Test Procedure

The frequency and amplitude of the six highest ac power-line conducted emissions relative to the limit, measured over all the current-carrying conductors of the EUT power cords, and the operating frequency or frequency to which the EUT is tuned (if appropriate), should be reported, unless such emissions are more than 20 dB below the limit. AC power-line conducted emissions measurements are to be separately carried out only on each of the phase ("hot") line(s) and (if used) on the neutral line(s), but not on the ground [protective earth] line(s). If less than six emission frequencies are within 20 dB of the limit, then the noise level of the measuring instrument at representative frequencies should be reported. The specific conductor of the power-line cord for each of the reported emissions should be identified. Measure the six highest emissions with respect to the limit on each current-carrying conductor of each power cord associated with the EUT (but not the power cords of associated or peripheral equipment that are part of the test configuration). Then, report the six highest emissions with respect to the limit from among all the measurements identifying the frequency and specific current-carrying conductor identified with the emission. The six highest emissions should be reported for each of the current-carrying conductors, or the six highest emissions may be reported over all the current-carrying conductors.

3.1.5 Corrected Amplitude & Margin Calculation

The basic equation is as follows:

Result = Reading + Factor
Factor = attenuation caused by cable loss + voltage division factor of AMN

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. The equation for margin calculation is as follows:

Margin = Limit – Result

3.2 Radiation Spurious Emissions

3.2.1 Applicable Standard

FCC §15.407 (b);

Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:
(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of – 27 dBm/MHz.
(2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of – 27 dBm/MHz.
(3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of – 27 dBm/MHz.
(4) For transmitters operating solely in the 5.725-5.850 GHz band:
(i) All emissions shall be limited to a level of – 27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.
(ii) Devices certified before March 2, 2017 with antenna gain greater than 10 dBi may demonstrate compliance with the emission limits in § 15.247(d), but manufacturing, marketing and importing of devices certified under this alternative must cease by March 2, 2018. Devices certified before March 2, 2018 with antenna gain of 10 dBi or less may demonstrate compliance with the emission limits in § 15.247(d), but manufacturing, marketing and importing of devices certified under this alternative must cease before March 2, 2020.
(8) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.
(9) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in § 15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in § 15.207.
(10) The provisions of § 15.205 apply to intentional radiators operating under this section.
(11) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency band edges as the design of the equipment permits.
(c) The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signalling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization a description of how this requirement is met.

RSS-247 Clause 6.2

Frequency band 5150-5250 MHz

6.2.1.2 Unwanted emission limits

For transmitters with operating frequencies in the band 5150-5250 MHz, all emissions outside the band 5150-5350 MHz shall not exceed -27 dBm/MHz e.i.r.p. Any unwanted emissions that fall into the band 5250-5350 MHz shall be attenuated below the channel power by at least 26 dB, when measured using a resolution bandwidth between 1 and 5% of the occupied bandwidth (i.e. 99% bandwidth), above 5250 MHz. The 26 dB bandwidth may fall into the 5250-5350 MHz band; however, if the occupied bandwidth also falls within the 5250-5350 MHz band, the transmission is considered as intentional and the devices shall comply with all requirements in the band 5250-5350 MHz including implementing dynamic frequency selection (DFS) and TPC, on the portion of the emission that resides in the 5250-5350 MHz band.

Frequency band 5725-5850 MHz

6.2.4.2 Unwanted emission limits

Devices operating in the band 5725-5850 MHz with antenna gain greater than 10 dBi can have unwanted emissions that comply with either the limits in this section or in section 5.5 until six (6) months after the publication date of this standard for certification. Certified devices that do not comply with emission limits in this section shall not be manufactured, imported, distributed, leased, offered for sale or sold after April 1, 2018.

Devices operating in the band 5725-5850 MHz with antenna gain of 10 dBi or less can have unwanted emissions that comply with either the limits in this section or in section 5.5 until April 1, 2018 for certification. Certified devices that do not comply with emission limits in this section shall not be manufactured, imported, distributed, leased, offered for sale or sold after April 1, 2020.

Devices operating in the band 5725-5850 MHz shall have e.i.r.p. of unwanted emissions comply with the following:

a) 27 dBm/MHz at frequencies from the band edges decreasing linearly to 15.6 dBm/MHz at 5 MHz above or below the band edges;

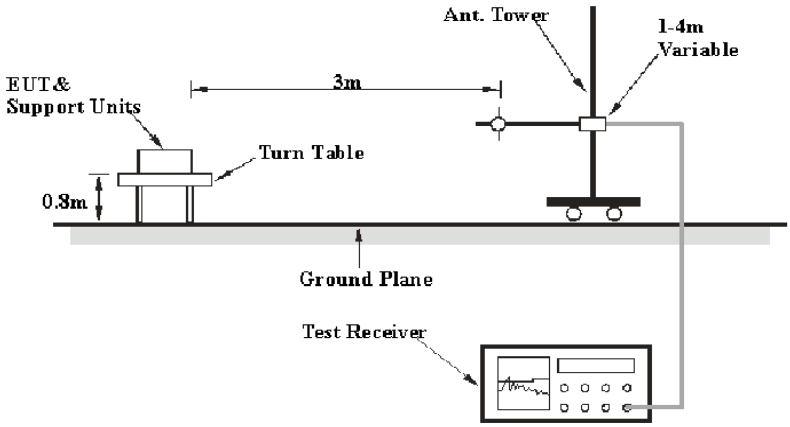
b) 15.6 dBm/MHz at 5 MHz above or below the band edges decreasing linearly to 10 dBm/MHz at 25 MHz above or below the band edges;

c) 10 dBm/MHz at 25 MHz above or below the band edges decreasing linearly to -27 dBm/MHz at 75 MHz above or below the band edges; and

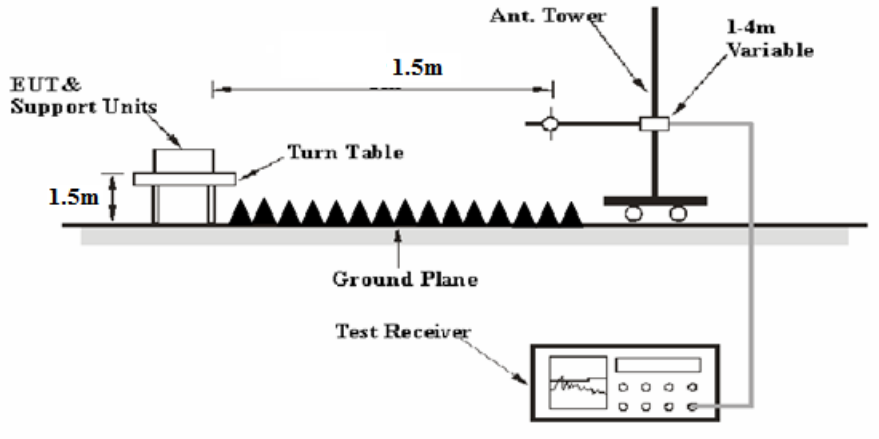
d) -27 dBm/MHz at frequencies more than 75 MHz above or below the band edges.

3.2.2 EUT Setup

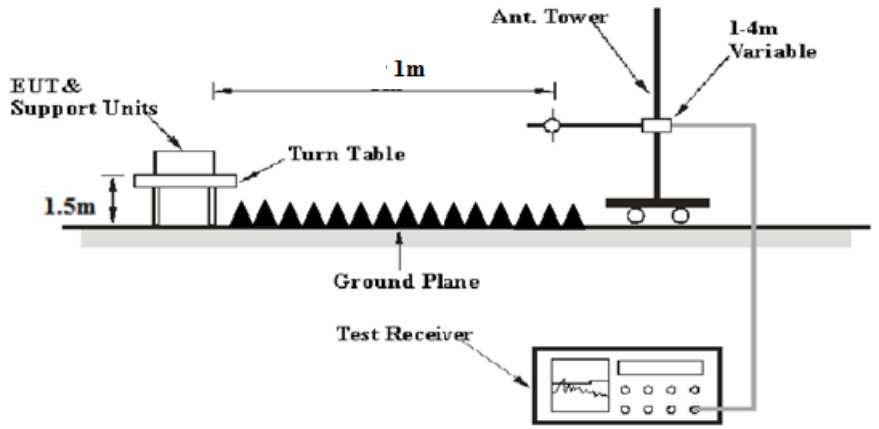
Below 1GHz:



1-26.5 GHz:



26.5-40 GHz:



The radiated emission tests were performed in the 3 meters chamber test site, , using the setup accordance with the ANSI C63.10-2013. The specification used was FCC 15.209, FCC 15.407, RSS-247, RSS-Gen limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

3.2.3 EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 40 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

30-1000MHz:

Measurement	RBW	Video B/W	IF B/W
QP	120 kHz	300 kHz	120kHz

1GHz- 40GHz:

Measurement	Duty cycle	RBW	Video B/W
PK	Any	1MHz	3 MHz
Ave.	>98%	1MHz	10 Hz
	<98%	1MHz	1/T

If the maximized peak measured value complies with under the QP/Average limit more than 6dB, then it is unnecessary to perform an QP/Average measurement.

3.2.4 Test Procedure

During the radiated emission test, the adapter was connected to the first AC floor outlet.

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz-1GHz, peak and Average detection modes for frequencies above 1GHz.

According to KDB 789033 D02 General UNII Test Procedures New Rules v02r01, emission shall be computed as: E [dBμV/m] = EIRP[dBm] + 95.2, for d = 3 meters.

According to C63.10, the above 1G test result shall be extrapolated to the specified distance using an extrapolation Factor of 20dB/decade from 3m to 1.5m or 1m
Distance extrapolation Factor =20 log (specific distance [3m]/test distance [1.5m]) dB= 6.02 dB
or
Distance extrapolation Factor =20 log (specific distance [3m]/test distance [1m]) dB= 9.54 dB

All emissions under the average limit and under the noise floor have not recorded in the report.

3.2.5 Corrected Amplitude & Margin Calculation

The basic equation is as follows:

Factor = Antenna Factor + Cable Loss- Amplifier Gain

For 30MHz-1GHz:
Result = Reading + Factor

For 1GHz-40GHz
Result = Reading + Factor+ Distance extrapolation Factor

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. The equation for margin calculation is as follows:

Margin = Limit – Result

3.3 Emission Bandwidth:

3.3.1 Applicable Standard

FCC §15.407 (a),(h)

(h)(2) Radar Detection Function of Dynamic Frequency Selection (DFS). U-NII devices operating with any part of its 26 dB emission bandwidth in the 5.25-5.35 GHz and 5.47-5.725 GHz bands shall employ a DFS radar detection mechanism to detect the presence of radar systems and to avoid co-channel operation with radar systems.

FCC §15.407 (e)

Within the 5.725-5.850 GHz and 5.850-5.895 GHz bands, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

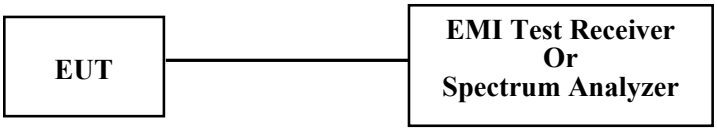
RSS-247 Clause 6.2.1.2

For transmitters with operating frequencies in the band 5150-5250 MHz, all emissions outside the band 5150-5350 MHz shall not exceed -27 dBm/MHz e.i.r.p. Any unwanted emissions that fall into the band 5250-5350 MHz shall be attenuated below the channel power by at least 26 dB, when measured using a resolution bandwidth between 1 and 5% of the occupied bandwidth (i.e. 99% bandwidth), above 5250 MHz. The 26 dB bandwidth may fall into the 5250-5350 MHz band; however, if the occupied bandwidth also falls within the 5250-5350 MHz band, the transmission is considered as intentional and the devices shall comply with all requirements in the band 5250-5350 MHz including implementing dynamic frequency selection (DFS) and TPC, on the portion of the emission that resides in the 5250-5350 MHz band.

RSS-247 Clause 6.2.4.1

For equipment operating in the band 5725-5850 MHz, the minimum 6 dB bandwidth shall be at least 500 kHz.

3.3.2 EUT Setup



3.3.3Test Procedure

26dB Emission Bandwidth:

According to ANSI C63.10-2013 Section 12.4.1

a) Set RBW = approximately 1% of the emission bandwidth.
b) Set the VBW > RBW.
c) Detector = peak.
d) Trace mode = max hold
e) Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the instrument. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

99% Occupied Bandwidth:

According to ANSI C63.10-2013 Section 12.4.2&6.9.3

The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission.
The following procedure shall be used for measuring 99% power bandwidth:
a) The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be between 1.5 times and 5.0 times the OBW.
b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW, and VBW shall be approximately three times the RBW, unless otherwise specified by the applicable requirement.
c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2.
d) Step a) through step c) might require iteration to adjust within the specified range.
e) Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
f) Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth.
g) If the instrument does not have a 99% power bandwidth function, then the trace data points are recovered and directly summed in linear power terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5% of the total is reached; that frequency is recorded as the upper frequency. The 99% power bandwidth is the difference between these two frequencies.
h) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

6 dB emission bandwidth:

According to KDB 789033 D02 General UNII Test Procedures New Rules v02r01

a) Set RBW = 100 kHz.
b) Set the video bandwidth (VBW) ≥ 3 RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Sweep = auto couple.
f) Allow the trace to stabilize.
g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.
Note: The automatic bandwidth measurement capability of a spectrum analyzer or EMI receiver may be employed if it implements the functionality described in this section. For devices that use channel aggregation refer to III.A and III.C for determining emission bandwidth.

3.4 Maximum conducted output power:

3.4.1 Applicable Standard

FCC §15.407(a) (1)(iv)
For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

FCC §15.407(a) (3)(i)

For the band 5.725-5.850 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

RSS-247 Clause 6.2.1.1

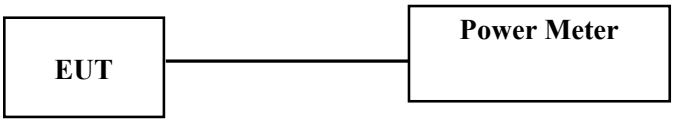
For OEM devices installed in vehicles, the maximum e.i.r.p. shall not exceed 30 mW or 1.76 + 10 $\log_{10}$B, dBm, whichever is less stringent. Devices shall implement transmitter power control (TPC) in order to have the capability to operate at least 3 dB below the maximum permitted e.i.r.p. of 30 mW.

For other devices, the maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 $\log_{10}$B, dBm, whichever power is less. B is the 99% emission bandwidth in megahertz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

RSS-247 Clause 6.2.4.1

The maximum conducted output power shall not exceed 1 W. The output power spectral density shall not exceed 30 dBm in any 500 kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the output power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed point-to-point operations exclude the use of point-to-multipoint3 systems, omnidirectional applications and multiple collocated transmitters transmitting the same information.

3.4.2 EUT Setup



3.4.3Test Procedure

According to ANSI C63.10-2013 Section 11.9.1.3

Method PM-G is measurement using a gated RF average power meter.
Measurements may be performed using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Because the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

3.5 Maximum power spectral density:

3.5.1 Applicable Standard

FCC §15.407(a) (1)(iv)
For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

FCC §15.407(a) (3)(i)

For the band 5.725-5.850 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

RSS-247 Clause 6.2.1.1

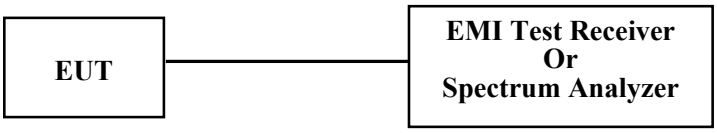
For OEM devices installed in vehicles, the maximum e.i.r.p. shall not exceed 30 mW or 1.76 + 10 $\log_{10}$B, dBm, whichever is less stringent. Devices shall implement transmitter power control (TPC) in order to have the capability to operate at least 3 dB below the maximum permitted e.i.r.p. of 30 mW.

For other devices, the maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 $\log_{10}$B, dBm, whichever power is less. B is the 99% emission bandwidth in megahertz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

RSS-247 Clause 6.2.4.1

The maximum conducted output power shall not exceed 1 W. The output power spectral density shall not exceed 30 dBm in any 500 kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the output power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed point-to-point operations exclude the use of point-to-multipoint3 systems, omnidirectional applications and multiple collocated transmitters transmitting the same information.

3.5.2 EUT Setup



3.5.3Test Procedure

According to KDB 789033 D02 General UNII Test Procedures New Rules v02r01

Method SA-3 (power averaging (rms) detection with max hold):
(i) Set span to encompass the entire EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal.

(ii) Set sweep trigger to "free run."

(iii) Set RBW = 1 MHz.

(iv) Set VBW ≥ 3 MHz

(v) Number of points in sweep ≥ 2 × span / RBW. (This ensures that bin-to-bin spacing is ≤ RBW/2, so that narrowband signals are not lost between frequency bins.)

(vi) Sweep time ≤ (number of points in sweep) × *T*, where *T* is defined in II.B.1.a).
Note: If this results in a sweep time less than the auto sweep time of the analyzer, Method SA-3 Alternative shall not be used. (The purpose of this step is to ensure that averaging time in each bin is less than or equal to the minimum time of a transmission.)
(vii) Detector = power averaging (rms).

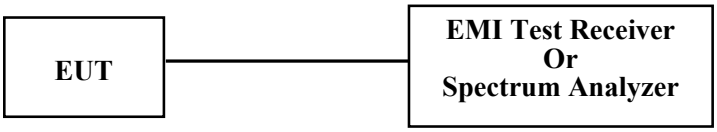
(viii) Trace mode = max hold.

(ix) Allow max hold to run for at least 60 seconds, or longer as needed to allow the trace to stabilize.

For devices operating in the band 5.725−5.85 GHz, the rules specify a measurement bandwidth of 500 kHz. Many spectrum analyzers do not have 500 kHz RBW, thus a narrower RBW may need to be used.

3.7 Duty Cycle:

3.7.1 EUT Setup



3.7.2Test Procedure

According to ANSI C63.10-2013 Section 12.2

The zero-span mode on a spectrum analyzer or EMI receiver if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the ON and OFF times of the transmitted signal:
1) Set the center frequency of the instrument to the center frequency of the transmission.
2) Set RBW ≥ OBW if possible; otherwise, set RBW to the largest available value.
3) Set VBW ≥ RBW. Set detector = peak or average.
4) The zero-span measurement method shall not be used unless both RBW and VBW are > 50/T and the number of sweep points across duration T exceeds 100. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring the duty cycle shall not be used if T ≤ 16.7 μs.)

3.8 Antenna Requirement

3.8.1 Applicable Standard

FCC §15.203

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §§15.211, 15.213, 15.217, 15.219, 15.221, or §15.236. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

RSS-GEN Clause 6.8

The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. The test report shall demonstrate the compliance of the transmitter with the limit for maximum equivalent isotropically radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list.

For expediting the testing, measurements may be performed using only the antenna with highest gain of each combination of transmitter and antenna type, with the transmitter output power set at the maximum level. However, the transmitter shall comply with the applicable requirements under all operational conditions and when in combination with any type of antenna from the list provided in the test report (and in the notice to be included in the user manual, provided below).
When measurements at the antenna port are used to determine the RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna's manufacturer.
The test report shall state the RF power, output power setting and spurious emission measurements with each antenna type that is used with the transmitter being tested.
For licence-exempt equipment with detachable antennas, the user manual shall also contain the following notice in a conspicuous location:
This radio transmitter [enter the device's ISED certification number] has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Immediately following the above notice, the manufacturer shall provide a list of all antenna types which can be used with the transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna type.

3.8.2 Judgment

Please refer to the Antenna Information detail in Section 1.

3.9 Additional requirement

3.9.1 Applicable Standard

According to RSS-247 Clause 6.4 Additional requirement

The following requirements shall apply:

a) The device shall automatically discontinue transmission in cases of absence of information to transmit, or operational failure. A description on how this is done shall accompany the application for equipment certification. Note that this is not intended to prohibit transmission of control or signalling information or the use of repetitive codes where required by the technology.

b) All LE-LAN devices must contain security features to protect against modification of software by unauthorized parties.

Manufacturers must implement security features in any digitally modulated devices capable of operating in any of the frequency ranges within the 5 GHz band, so that third parties are not able to reprogram the device to operate outside the parameters for which the device was certified. The software must prevent the user from operating the transmitter with operating frequencies, output power, modulation types or other radio frequency parameters outside those that were approved for the device. Manufacturers may use various means, including the use of a private network that allows only authenticated users to download software, electronic signatures in software or coding in hardware that is decoded by software to verify that new software can be legally loaded into a device to meet these requirements and must describe the methods in their application for equipment certification.

Manufacturers must take steps to ensure that DFS functionality cannot be disabled by the operator of the LE-LAN device.

c) The user manual for LE-LAN devices shall contain instructions related to the restrictions mentioned in the above sections, namely that:

i. the device for operation in the band 5150–5250 MHz is only for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems;[4]

ii. for devices with detachable antenna(s), the maximum antenna gain permitted for devices in the bands 5250-5350 MHz and 5470-5725 MHz shall be such that the equipment still complies with the e.i.r.p. limit;

iii. for devices with detachable antenna(s), the maximum antenna gain permitted for devices in the band 5725-5850 MHz shall be such that the equipment still complies with the e.i.r.p. limits as appropriate; and

iv. where applicable, antenna type(s), antenna models(s), and worst-case tilt angle(s) necessary to remain compliant with the e.i.r.p. elevation mask requirement set forth in section 6.2.2.3 shall be clearly indicated.

3.9.2 Judgment

RSS-247 Clause 6.4 a):

The device shall automatically discontinue transmission in cases of absence of information to transmit, or operational failure. Please refer to the declaration

RSS-247 Clause 6.4 b):

The devices must contain security features to protect against modification of software by unauthorized parties. Please refer to the declaration

RSS-247 Clause 6.4 c):

The device operates on 5725-5850MHz on Canada market, all the EIPR compliance with RSS-247 requirement. Please refer to the conducted output power test result.

4. Test DATA AND RESULTS

4.1 AC Line Conducted Emissions

Not Applicable.

4.2 Radiation Spurious Emissions

Serial Number:	CR21090094-RF-S4	Test Date:	2021-10-22~2021-10-24
Test Site:	966-1,966-2	Test Mode:	Transmitting
Tester:	Great Qiao, Tommy luo	Test Result:	Pass

Environmental Conditions:					
Temperature: (℃)	23.1~26.9	Relative Humidity: (%)	45~65	ATM Pressure: (kPa)	100.8~102.1

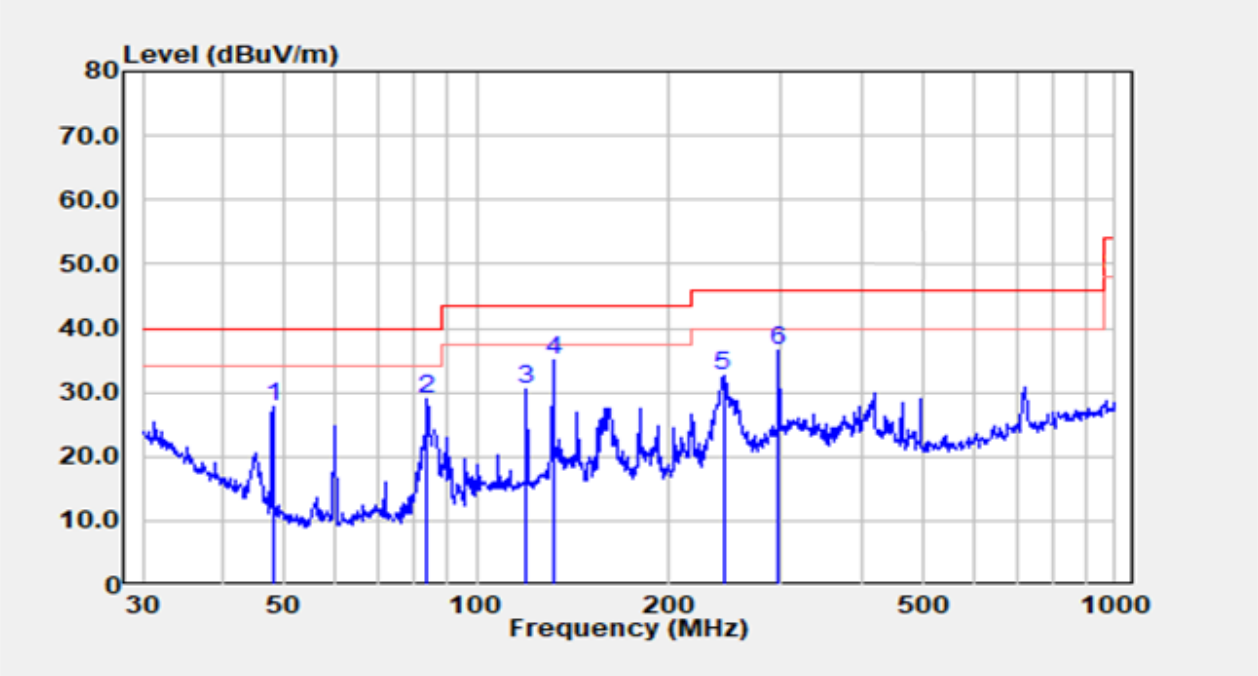
Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Sunol Sciences	Antenna	JB6	A082520-5	2020-10-19	2023-10-18
R&S	EMI Test Receiver	ESR3	102724	2021-07-22	2022-07-21
TIMES MICROWAVE	Coaxial Cable	LMR-600-UltraFlex	C-0470-02	2021-07-18	2022-07-17
TIMES MICROWAVE	Coaxial Cable	LMR-600-UltraFlex	C-0780-01	2021-07-18	2022-07-17
Sonoma	Amplifier	310N	186165	2021-07-18	2022-07-17
Audix	Test Software	E3	201021 (V9)	N/A	N/A
ETS-Lindgren	Horn Antenna	3115	9912-5985	2020-10-13	2023-10-12
PASTERNACK	Horn Antenna	PE9852/2F-20	112002	2021-02-05	2023-02-04
PASTERNACK	Horn Antenna	PE9850/2F-20	072001	2021-02-05	2023-02-04
R&S	Spectrum Analyzer	FSV40	101591	2021-07-22	2022-07-21
MICRO-COAX	Coaxial Cable	UFA210A-1-1200-70U300	217423-008	2021-08-08	2022-08-07
MICRO-COAX	Coaxial Cable	UFA210A-1-2362-300300	235780-001	2021-08-08	2022-08-07
MICRO-COAX	Coaxial Cable	UFB142A-1-2362-200200	235772-001	2021-08-08	2022-08-07
Mini	Pre-amplifier	ZVA-183-S+	5969001149	2021-08-08	2022-08-07
AH	Preamplifier	PAM-1840VH	190	2020-11-20	2021-11-19
Mini Circuits	High Pass Filter	VHF-6010+	31119	2021-08-08	2022-08-07
E-Microwave	Band Rejection Filter	5150-5850MHz	OE01902423	2021-08-08	2022-08-07

** Statement of Traceability: China Certification ICT Co., Ltd (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).*

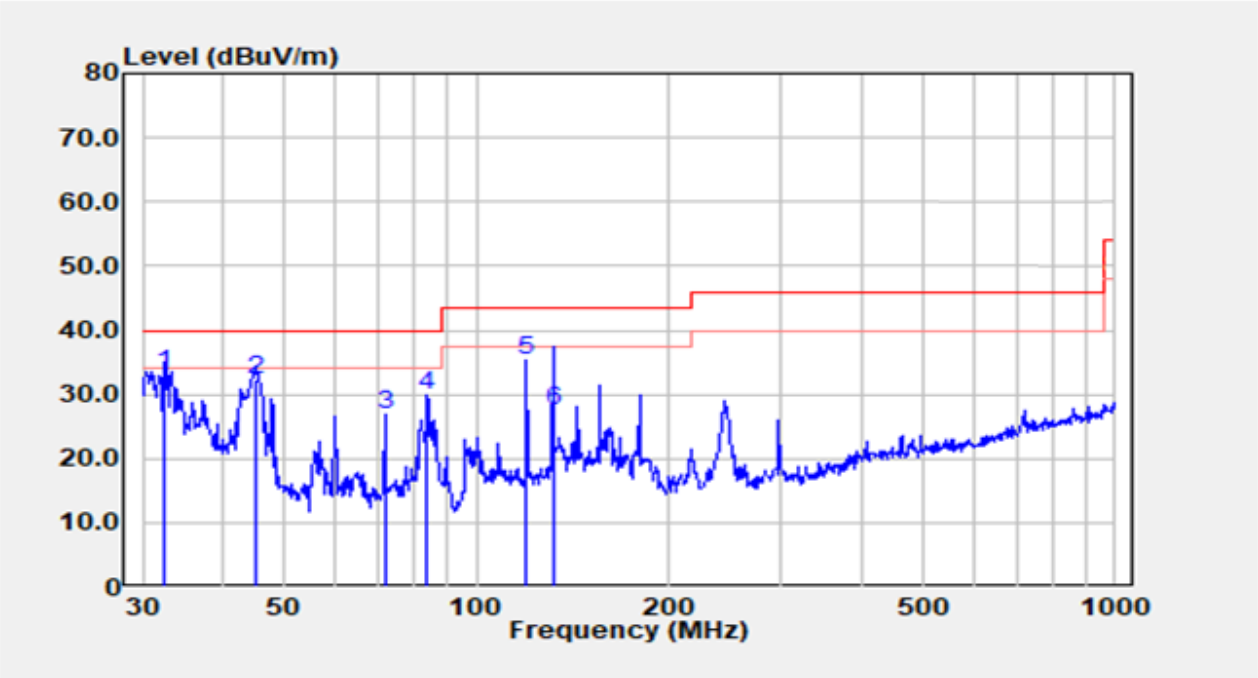
1) 30MHz-1GHz (1.4MHz 5.8GHz Middle channel was the worst)

Horizontal:



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	47.994	44.03	-16.24	27.79	40.00	12.21	Peak
2	83.816	46.37	-17.49	28.88	40.00	11.12	Peak
3	119.856	42.19	-11.75	30.43	43.50	13.07	Peak
4	131.758	46.75	-11.64	35.12	43.50	8.38	Peak
5	243.377	45.64	-13.14	32.51	46.00	13.49	Peak
6	297.224	47.41	-10.88	36.52	46.00	9.48	Peak

Vertical:



No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	32.520	38.80	-5.74	33.06	40.00	6.94	QP
2	45.217	46.93	-14.58	32.35	40.00	7.65	QP
3	71.832	43.76	-16.91	26.85	40.00	13.15	Peak
4	83.816	47.23	-17.49	29.74	40.00	10.26	Peak
5	119.856	47.05	-11.75	35.30	43.50	8.20	Peak
6	131.758	39.19	-11.64	27.55	43.50	15.95	QP

2) 1GHz-40GHz:
5150-5250MHz

Frequency (MHz)	Receiver		Polar (H/V)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector					
802.11n ht40,Low Channel: 5190 MHz							
5190.00	56.99	PK	H	38.69	89.66	N/A	N/A
5190.00	47.95	AV	H	38.69	80.62	N/A	N/A
5190.00	64.05	PK	V	38.69	96.72	N/A	N/A
5190.00	54.17	AV	V	38.69	86.84	N/A	N/A
5150.00	29.84	PK	V	38.64	62.46	74.00	11.54
5150.00	17.84	AV	V	38.64	50.46	54.00	3.54
10380.00	34.62	PK	V	18.45	47.05	68.20	21.15
15570.00	34.62	PK	V	21.15	49.75	74.00	24.25
15570.00	22.51	AV	V	21.15	37.64	54.00	16.36
11678.00	47.85	PK	V	20.35	62.18	74.00	11.82
11678.00	29.87	AV	V	20.35	44.2	54.00	9.80
802.11n ht40, High Channel: 5230 MHz							
5230.00	55.48	PK	H	38.81	88.27	N/A	N/A
5230.00	46.35	AV	H	38.81	79.14	N/A	N/A
5230.00	62.67	PK	V	38.81	95.46	N/A	N/A
5230.00	52.48	AV	V	38.81	85.27	N/A	N/A
5350.00	29.67	PK	V	39.03	62.68	74.00	11.32
5350.00	16.85	AV	V	39.03	49.86	54.00	4.14
10460.00	33.25	PK	V	18.25	45.48	68.20	22.72
15690.00	34.61	PK	V	21.21	49.8	74.00	24.20
15690.00	22.54	AV	V	21.21	37.73	54.00	16.27
11678.00	48.32	PK	V	20.35	62.65	74.00	11.35
11678.00	29.68	AV	V	20.35	44.01	54.00	9.99
802.11ac80, Middle channel: 5210 MHz							
5210.00	51.42	PK	H	38.74	84.14	N/A	N/A
5210.00	41.33	AV	H	38.74	74.05	N/A	N/A
5210.00	58.59	PK	V	38.74	91.31	N/A	N/A
5210.00	49.35	AV	V	38.74	82.07	N/A	N/A
5150.00	29.54	PK	V	38.64	62.16	74.00	11.84
5150.00	16.38	AV	V	38.64	49	54.00	5.00
5350.00	29.47	PK	V	39.03	62.48	74.00	11.52
5350.00	16.58	AV	V	39.03	49.59	54.00	4.41
10420.00	33.54	PK	V	18.40	45.92	68.20	22.28
15630.00	34.26	PK	V	21.06	49.3	74.00	24.70
15630.00	22.51	AV	V	21.06	37.55	54.00	16.45
11678.00	47.35	PK	V	20.35	61.68	74.00	12.32
11678.00	29.84	AV	V	20.35	44.17	54.00	9.83

1.4M

Frequency (MHz)	Receiver		Polar (H/V)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector					
Low Channel: 5154 MHz							
5154.00	80.52	PK	H	38.65	113.15	N/A	N/A
5154.00	74.36	AV	H	38.65	106.99	N/A	N/A
5154.00	85.65	PK	V	38.65	118.28	N/A	N/A
5154.00	79.96	AV	V	38.65	112.59	N/A	N/A
5150.00	33.19	PK	V	38.64	65.81	74.00	8.19
5150.00	18.16	AV	V	38.64	50.78	54.00	3.22
10308.00	53.62	PK	V	18.37	65.97	68.2	2.23
15462.00	34.85	PK	V	21.53	50.36	74.00	23.64
15462.00	22.76	AV	V	21.53	38.27	54.00	15.73
Middle Channel: 5201 MHz							
5201.00	81.95	PK	H	38.70	114.63	N/A	N/A
5201.00	74.75	AV	H	38.70	107.43	N/A	N/A
5201.00	86.47	PK	V	38.70	119.15	N/A	N/A
5201.00	80.21	AV	V	38.70	112.89	N/A	N/A
10402.00	54.62	PK	V	18.47	67.07	68.2	1.13
15603.00	34.76	PK	V	20.99	49.73	74.00	24.27
15603.00	22.58	AV	V	20.99	37.55	54.00	16.45
High Channel: 5246 MHz							
5246.00	81.26	PK	H	38.87	114.11	N/A	N/A
5246.00	74.35	AV	H	38.87	107.20	N/A	N/A
5246.00	86.31	PK	V	38.87	119.16	N/A	N/A
5246.00	80.46	AV	V	38.87	113.31	N/A	N/A
5350.00	31.26	PK	V	39.03	64.27	74.00	9.73
5350.00	7.16	AV	V	39.03	40.17	54.00	13.83
10492.00	55.12	PK	V	18.13	67.23	68.2	0.97
15738.00	34.66	PK	V	21.25	49.89	74.00	24.11
15738.00	22.56	AV	V	21.25	37.79	54.00	16.21

10M

Frequency (MHz)	Receiver		Polar (H/V)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector					
Low Channel: 5157MHz							
5157.00	71.70	PK	H	38.65	104.33	N/A	N/A
5157.00	63.25	AV	H	38.65	95.88	N/A	N/A
5157.00	75.91	PK	V	38.65	108.54	N/A	N/A
5157.00	67.09	AV	V	38.65	99.72	N/A	N/A
5150.00	32.56	PK	V	38.64	65.18	74.00	8.82
5150.00	18.55	AV	V	38.64	51.17	54.00	2.83
10314.00	42.35	PK	V	18.38	54.71	68.20	13.49
15471.00	34.87	PK	V	21.54	50.39	74.00	23.61
15471.00	22.55	AV	V	21.54	38.07	54.00	15.93
Middle Channel: 5201 MHz							
5201.00	76.34	PK	H	38.70	109.02	N/A	N/A
5201.00	70.25	AV	H	38.70	102.93	N/A	N/A
5201.00	81.42	PK	V	38.70	114.10	N/A	N/A
5201.00	73.11	AV	V	38.70	105.79	N/A	N/A
10402.00	48.97	PK	V	18.47	61.42	68.20	6.78
15603.00	34.68	PK	V	20.99	49.65	74.00	24.35
15603.00	22.53	AV	V	20.99	37.50	54.00	16.50
High Channel: 5243 MHz							
5243.00	76.25	PK	H	38.87	109.10	N/A	N/A
5243.00	70.14	AV	H	38.87	102.99	N/A	N/A
5243.00	81.31	PK	V	38.87	114.16	N/A	N/A
5243.00	73.12	AV	V	38.87	105.97	N/A	N/A
5350.00	30.99	PK	V	39.03	64.00	74.00	10.00
5350.00	8.04	AV	V	39.03	41.05	54.00	12.95
10486.00	49.26	PK	V	18.15	61.39	68.20	6.81
15729.00	34.76	PK	V	21.25	49.99	74.00	24.01
15729.00	22.58	AV	V	21.25	37.81	54.00	16.19

20M

Frequency (MHz)	Receiver		Polar (H/V)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector					
Low Channel: 5167 MHz							
5167.00	66.62	PK	H	38.66	99.26	N/A	N/A
5167.00	57.89	AV	H	38.66	90.53	N/A	N/A
5167.00	74.45	PK	V	38.66	107.09	N/A	N/A
5167.00	65.47	AV	V	38.66	98.11	N/A	N/A
5150.00	30.76	PK	V	38.64	63.38	74.00	10.62
5150.00	18.43	AV	V	38.64	51.05	54.00	2.95
10334.00	36.94	PK	V	18.39	49.31	68.20	18.89
15501.00	34.51	PK	V	21.54	50.03	74.00	23.97
15501.00	22.81	AV	V	21.54	38.33	54.00	15.67
Middle Channel: 5201 MHz							
5201.00	71.94	PK	H	38.70	104.62	N/A	N/A
5201.00	62.49	AV	H	38.70	95.17	N/A	N/A
5201.00	79.39	PK	V	38.70	112.07	N/A	N/A
5201.00	70.52	AV	V	38.70	103.20	N/A	N/A
10402.00	43.78	PK	V	18.47	56.23	68.20	11.97
15603.00	34.78	PK	V	20.99	49.75	74.00	24.25
15603.00	22.96	AV	V	20.99	37.93	54.00	16.07
High Channel: 5233 MHz							
5233.00	71.52	PK	H	38.83	104.33	N/A	N/A
5233.00	62.48	AV	H	38.83	95.29	N/A	N/A
5233.00	79.92	PK	V	38.83	112.73	N/A	N/A
5233.00	69.94	AV	V	38.83	102.75	N/A	N/A
5350.00	29.51	PK	V	39.03	62.52	74.00	11.48
5350.00	16.54	AV	V	39.03	49.55	54.00	4.45
10466.00	43.62	PK	V	18.23	55.83	68.20	12.37
15699.00	34.65	PK	V	21.24	49.87	74.00	24.13
15699.00	23.51	AV	V	21.24	38.73	54.00	15.27

Note:
Result = Reading + Factor- Distance extrapolation Factor
For 1-26.5GHz:
Distance extrapolation Factor =20 log (specific distance [3m]/test distance [1.5m]) dB= 6.02 dB
For 26.5-40GHz:
Distance extrapolation Factor =20 log (specific distance [3m]/test distance [1m]) dB= 9.54 dB

5725-5850MHz:

Frequency (MHz)	Receiver		Polar (H/V)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector					
802.11n ht40,Low Channel: 5755 MHz							
5755.00	58.07	PK	H	39.45	91.50	N/A	N/A
5755.00	49.38	AV	H	39.45	82.81	N/A	N/A
5755.00	67.32	PK	V	39.45	100.75	N/A	N/A
5755.00	58.33	AV	V	39.45	91.76	N/A	N/A
5725.00	33.01	PK	V	39.48	66.47	122.20	55.73
5720.00	33.79	PK	V	39.49	67.26	110.80	43.54
5700.00	31.76	PK	V	39.51	65.25	105.20	39.95
5650.00	30.68	PK	V	39.49	64.15	68.20	4.05
11510.00	34.62	PK	V	19.99	48.59	74.00	25.41
11510.00	23.37	AV	V	19.99	37.34	54.00	16.66
17265.00	34.25	PK	V	26.34	54.57	68.20	13.63
802.11n ht40, High Channel: 5795 MHz							
5795.00	58.03	PK	H	39.43	91.44	N/A	N/A
5795.00	48.87	AV	H	39.43	82.28	N/A	N/A
5795.00	67.54	PK	V	39.43	100.95	N/A	N/A
5795.00	58.43	AV	V	39.43	91.84	N/A	N/A
5850.00	32.43	PK	V	39.49	65.90	122.20	56.30
5855.00	32.68	PK	V	39.51	66.17	110.80	44.63
5875.00	32.83	PK	V	39.60	66.41	105.20	38.79
5925.00	30.74	PK	V	39.68	64.40	68.20	3.80
11590.00	35.20	PK	V	19.55	48.73	74.00	25.27
11590.00	23.42	AV	V	19.55	36.95	54.00	17.05
17385.00	34.23	PK	V	26.53	54.74	68.20	13.46
802.11ac80, low channel: 5775 MHz							
5775.00	52.33	PK	H	39.44	85.75	N/A	N/A
5775.00	43.75	AV	H	39.44	77.17	N/A	N/A
5775.00	62.08	PK	V	39.44	95.50	N/A	N/A
5775.00	53.73	AV	V	39.44	87.15	N/A	N/A
5725.00	31.81	PK	V	39.48	65.27	122.20	56.93
5720.00	32.08	PK	V	39.49	65.55	110.80	45.25
5700.00	32.24	PK	V	39.51	65.73	105.20	39.47
5650.00	29.88	PK	V	39.49	63.35	68.20	4.85
5850.00	32.00	PK	V	39.49	65.47	122.20	56.73
5855.00	31.49	PK	V	39.51	64.98	110.80	45.82
5875.00	32.18	PK	V	39.60	65.76	105.20	39.44
5925.00	30.57	PK	V	39.68	64.23	68.20	3.97
11550.00	32.86	PK	V	19.77	46.61	74.00	27.39
11550.00	24.32	AV	V	19.77	38.07	54.00	15.93
17325.00	34.32	PK	V	26.83	55.13	68.20	13.07

1.4M

Frequency (MHz)	Receiver		Polar (H/V)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector					
Low Channel: 5728 MHz							
5728.00	75.06	PK	H	39.48	108.52	N/A	N/A
5728.00	69.34	AV	H	39.48	102.80	N/A	N/A
5728.00	81.58	PK	V	39.48	115.04	N/A	N/A
5728.00	75.46	AV	V	39.48	108.92	N/A	N/A
5725.00	33.06	PK	V	39.48	66.52	122.20	55.68
5720.00	31.83	PK	V	39.49	65.30	110.80	45.50
5700.00	30.76	PK	V	39.51	64.25	105.20	40.95
5650.00	30.86	PK	V	39.49	64.33	68.20	3.87
11456.00	50.26	PK	V	19.81	64.05	74.00	9.95
11456.00	38.54	AV	V	19.81	52.33	54.00	1.67
17184.00	34.57	PK	V	25.34	53.89	68.20	14.31
Middle Channel: 5789 MHz							
5789.00	74.58	PK	H	39.44	108.00	N/A	N/A
5789.00	68.43	AV	H	39.44	101.85	N/A	N/A
5789.00	80.69	PK	V	39.44	114.11	N/A	N/A
5789.00	74.64	AV	V	39.44	108.06	N/A	N/A
11578.00	48.81	PK	V	19.63	62.42	74.00	11.58
11578.00	37.95	AV	V	19.63	51.56	54.00	2.44
17367.00	34.57	PK	V	26.62	55.17	68.20	13.03
High Channel: 5847 MHz							
5847.00	72.48	PK	H	39.49	105.95	N/A	N/A
5847.00	66.94	AV	H	39.49	100.41	N/A	N/A
5847.00	78.18	PK	V	39.49	111.65	N/A	N/A
5847.00	72.56	AV	V	39.49	106.03	N/A	N/A
5850.00	32.64	PK	V	39.49	66.11	122.20	56.09
5855.00	31.72	PK	V	39.51	65.21	110.80	45.59
5875.00	31.93	PK	V	39.60	65.51	105.20	39.69
5925.00	31.82	PK	V	39.68	65.48	68.20	2.72
11694.00	47.39	PK	V	20.52	61.89	74.00	12.11
11694.00	35.45	AV	V	20.52	49.95	54.00	4.05
17541.00	34.62	PK	V	28.24	56.84	68.20	11.36

10M

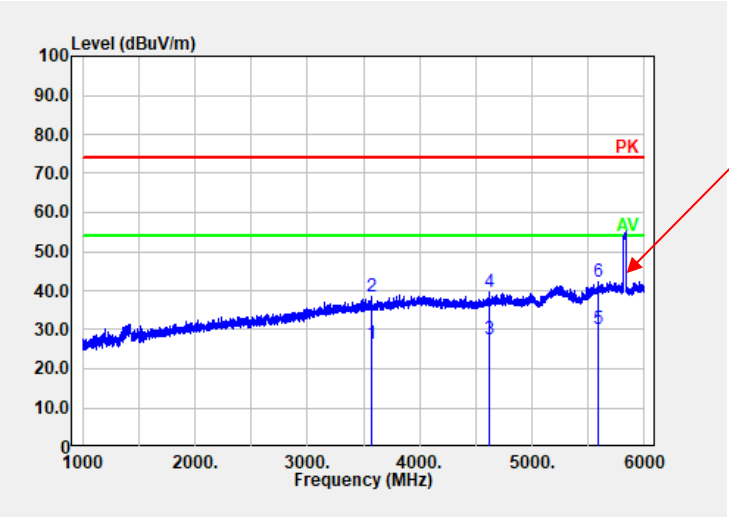
Frequency (MHz)	Receiver		Polar (H/V)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector					
Low Channel: 5733 MHz							
5733.00	72.54	PK	H	39.47	105.99	N/A	N/A
5733.00	67.45	AV	H	39.47	100.90	N/A	N/A
5733.00	79.53	PK	V	39.47	112.98	N/A	N/A
5733.00	70.68	AV	V	39.47	104.13	N/A	N/A
5725.00	35.88	PK	V	39.48	69.34	122.20	52.86
5720.00	32.05	PK	V	39.49	65.52	110.80	45.28
5700.00	31.29	PK	V	39.51	64.78	105.20	40.42
5650.00	30.69	PK	V	39.49	64.16	68.20	4.04
11466.00	44.65	PK	V	19.86	58.49	74.00	15.51
11466.00	34.25	AV	V	19.86	48.09	54.00	5.91
17199.00	34.76	PK	V	25.24	53.98	68.20	14.22
Middle Channel: 5789 MHz							
5789.00	74.09	PK	H	39.44	107.51	N/A	N/A
5789.00	63.94	AV	H	39.44	97.36	N/A	N/A
5789.00	80.59	PK	V	39.44	114.01	N/A	N/A
5789.00	71.19	AV	V	39.44	104.61	N/A	N/A
11578.00	48.52	PK	V	19.63	62.13	74.00	11.87
11578.00	36.93	AV	V	19.63	50.54	54.00	3.46
17367.00	34.67	PK	V	26.62	55.27	68.20	12.93
High Channel: 5842 MHz							
5842.00	72.74	PK	H	39.48	106.20	N/A	N/A
5842.00	61.78	AV	H	39.48	95.24	N/A	N/A
5842.00	79.13	PK	V	39.48	112.59	N/A	N/A
5842.00	69.69	AV	V	39.48	103.15	N/A	N/A
5850.00	42.54	PK	V	39.49	76.01	122.20	46.19
5855.00	35.51	PK	V	39.51	69.00	110.80	41.80
5875.00	32.22	PK	V	39.60	65.80	105.20	39.40
5925.00	31.42	PK	V	39.68	65.08	68.20	3.12
11684.00	47.68	PK	V	20.41	62.07	74.00	11.93
11684.00	36.84	AV	V	20.41	51.23	54.00	2.77
17526.00	34.62	PK	V	28.30	56.90	68.20	11.30

20M

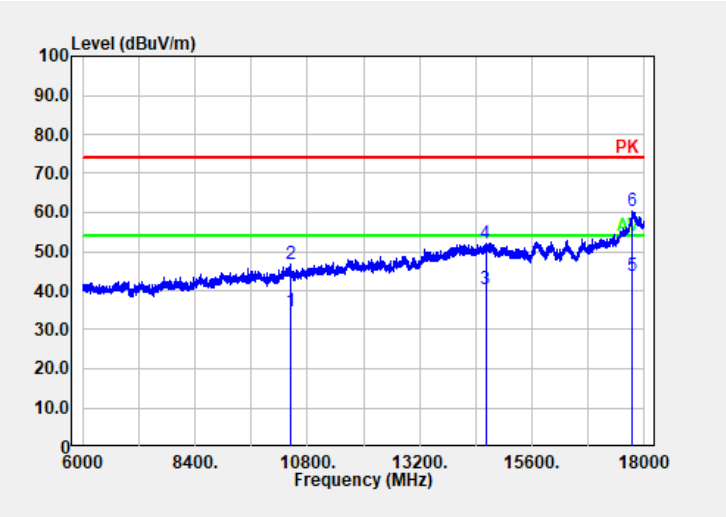
Frequency (MHz)	Receiver		Polar (H/V)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector					
Low Channel: 5738 MHz							
5738.00	71.62	PK	H	39.47	105.07	N/A	N/A
5738.00	60.78	AV	H	39.47	94.23	N/A	N/A
5738.00	77.91	PK	V	39.47	111.36	N/A	N/A
5738.00	68.77	AV	V	39.47	102.22	N/A	N/A
5725.00	34.58	PK	V	39.48	68.04	122.20	54.16
5720.00	33.25	PK	V	39.49	66.72	110.80	44.08
5700.00	31.32	PK	V	39.51	64.81	105.20	40.39
5650.00	31.73	PK	V	39.49	65.20	68.20	3.00
11476.00	46.85	PK	V	19.91	60.74	74.00	13.26
11476.00	35.94	AV	V	19.91	49.83	54.00	4.17
17214.00	34.62	PK	V	25.48	54.08	68.20	14.12
Middle Channel: 5790 MHz							
5790.00	71.45	PK	H	39.44	104.87	N/A	N/A
5790.00	61.94	AV	H	39.44	95.36	N/A	N/A
5790.00	77.62	PK	V	39.44	111.04	N/A	N/A
5790.00	67.99	AV	V	39.44	101.41	N/A	N/A
11580.00	45.78	PK	V	19.62	59.38	74.00	14.62
11580.00	34.44	AV	V	19.62	48.04	54.00	5.96
17370.00	34.85	PK	V	26.59	55.42	68.20	12.78
High Channel: 5839 MHz							
5839.00	70.95	PK	H	39.48	104.41	N/A	N/A
5839.00	61.25	AV	H	39.48	94.71	N/A	N/A
5839.00	78.46	PK	V	39.48	111.92	N/A	N/A
5839.00	68.06	AV	V	39.48	101.52	N/A	N/A
5850.00	41.26	PK	V	39.49	74.73	122.20	47.47
5855.00	39.77	PK	V	39.51	73.26	110.80	37.54
5875.00	32.84	PK	V	39.60	66.42	105.20	38.78
5925.00	31.24	PK	V	39.68	64.90	68.20	3.30
11678.00	47.21	PK	V	20.35	61.54	74.00	12.46
11678.00	36.25	AV	V	20.35	50.58	54.00	3.42
17517.00	34.51	PK	V	28.35	56.84	68.20	11.36

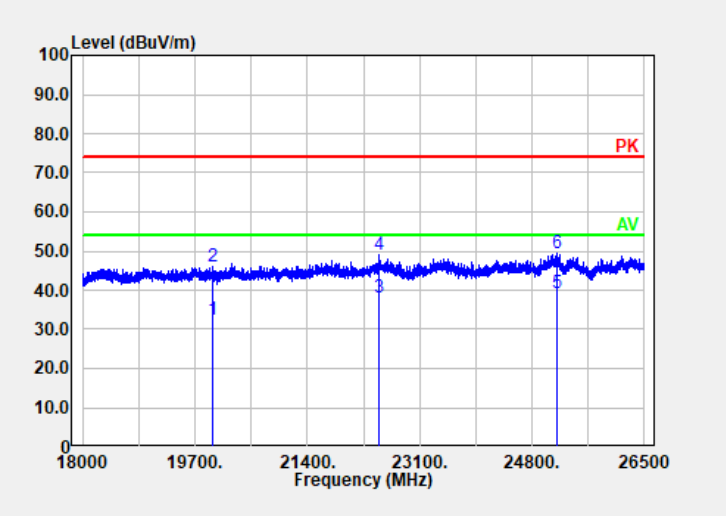
Note:
Result = Reading + Factor- Distance extrapolation Factor
For 1-26.5GHz:
Distance extrapolation Factor =20 log (specific distance [3m]/test distance [1.5m]) dB= 6.02 dB
For 26.5-40GHz:
Distance extrapolation Factor =20 log (specific distance [3m]/test distance [1m]) dB= 9.54 dB

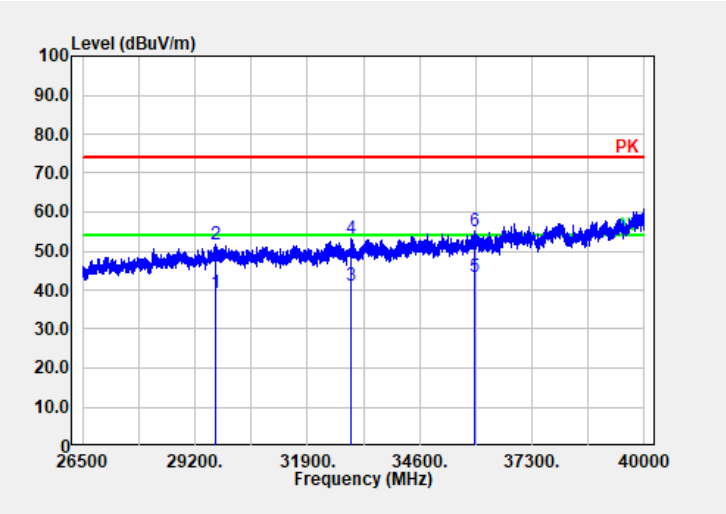
Worst Test plots(1.4MHz 5.8G Band Low channel was the worst)
Horizontal:



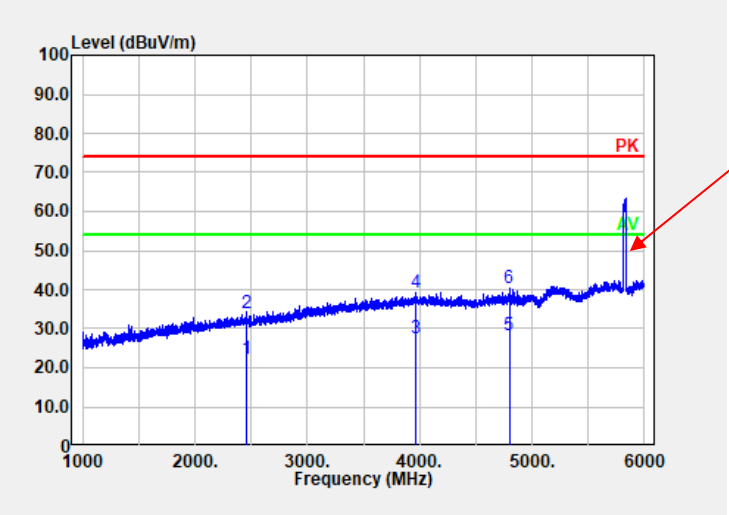
Fundamental Test with Band Rejection Filter



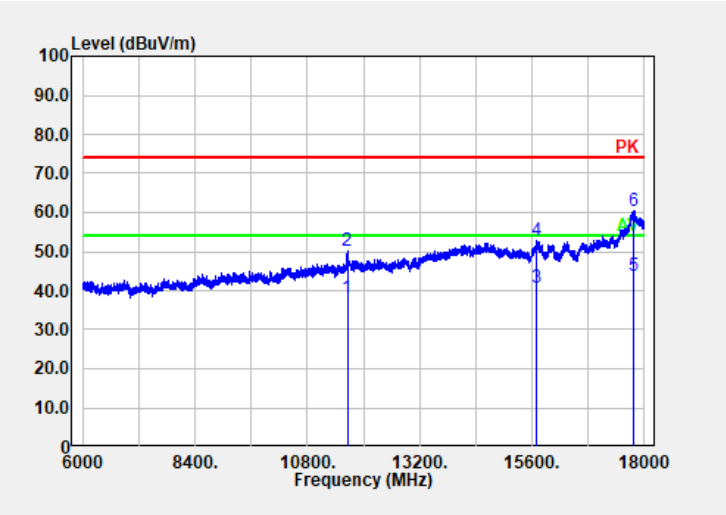


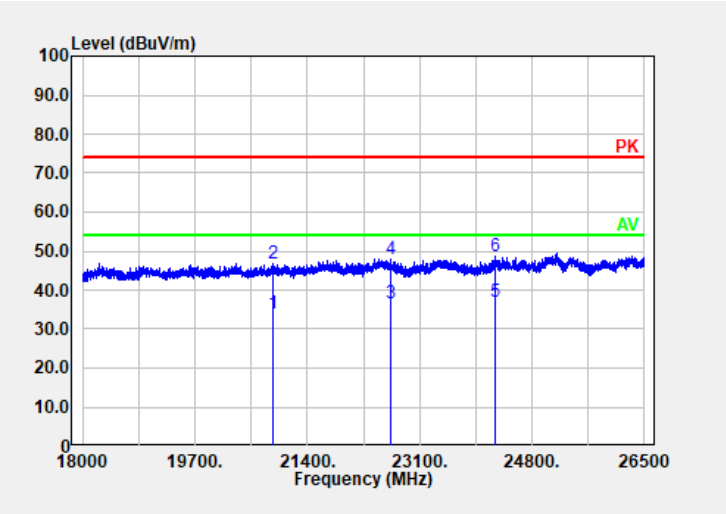


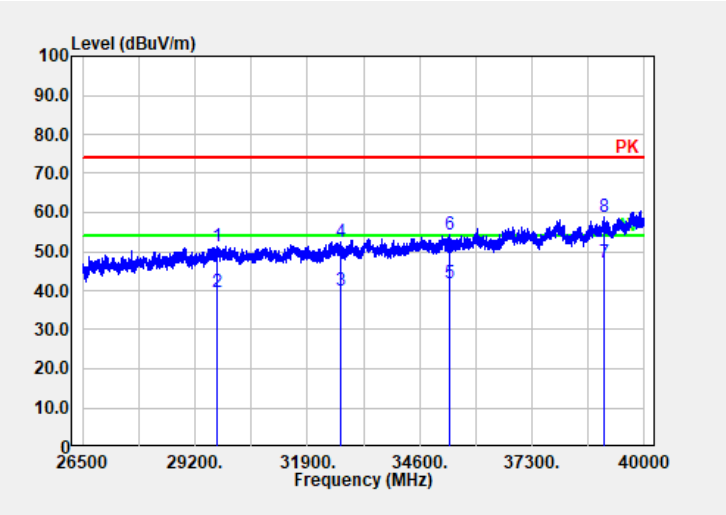
Vertical:



Fundamental Test with Band Rejection Filter




Level (dBuV/m)
100
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
PK
AV
1
2
3
4
5
6
18000
19700.
21400.
23100.
24800.
26500
Frequency (MHz)


Level (dBuV/m)
100
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
PK
1
2
3
4
5
6
7
8
26500
29200.
31900.
34600.
37300.
40000
Frequency (MHz)

4.3 Emission Bandwidth:

Serial Number:	CR21090094-RF-S4	Test Date:	2021-09-30~2021-11-11
Test Site:	RF	Test Mode:	Transmitting
Tester:	Great Qiao	Test Result:	Pass

Environmental Conditions:					
Temperature: (℃)	25.4~27.6	Relative Humidity: (%)	53~73	ATM Pressure: (kPa)	100. 4~101.3

Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSV40	101474	2021-07-22	2022-07-21
Unknown	Coaxial Cable	C-SJ0010	C0010	Each time	N/A

** Statement of Traceability: China Certification ICT Co., Ltd (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).*

Test Data:

5150-5250MHz:

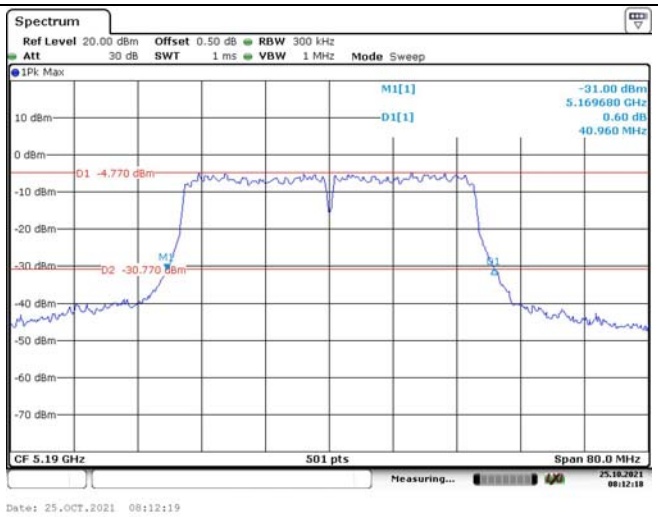
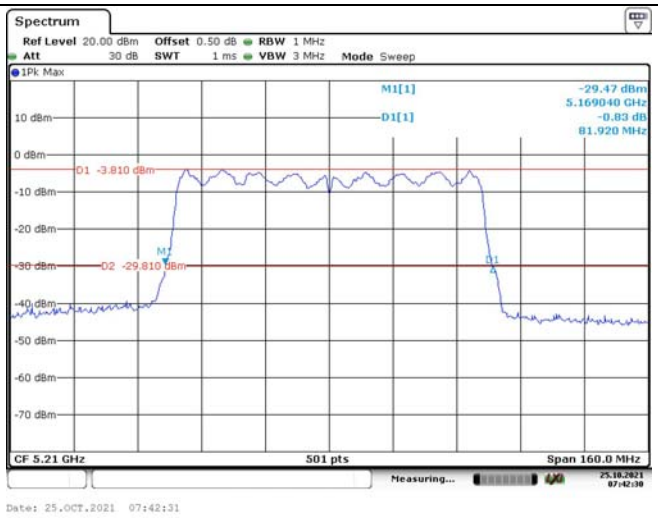
Mode	Frequency (MHz)	26 dB Emission Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
802.11n ht40	5190	40.960	36.886
	5230	41.120	36.886
802.11ac vht80	5210	81.920	76.008
1.4M	5154	1.224	1.137
	5201	1.242	1.133
	5246	1.229	1.133
10M	5157	9.574	8.944
	5201	9.568	8.944
	5243	9.586	8.944
20M	5167	18.955	17.945
	5201	19.012	17.945
	5233	18.968	18.002
Note: test was performed at Chain 0.			

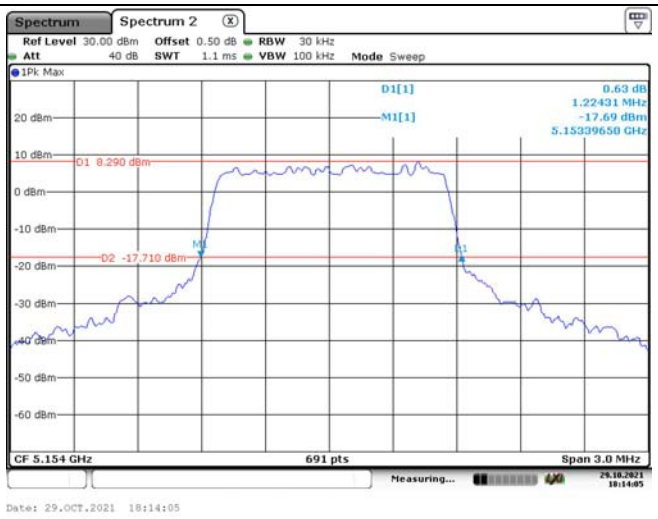
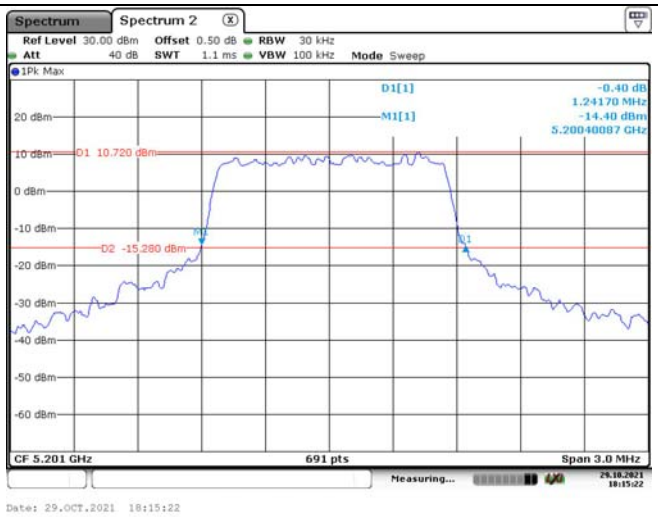
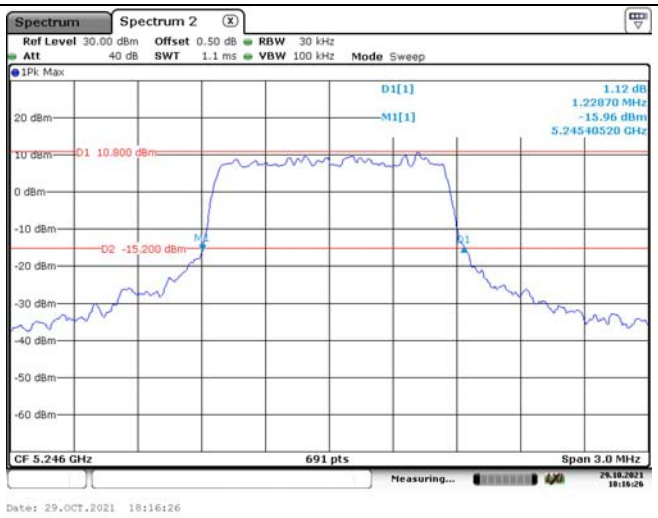
5725-5850MHz:

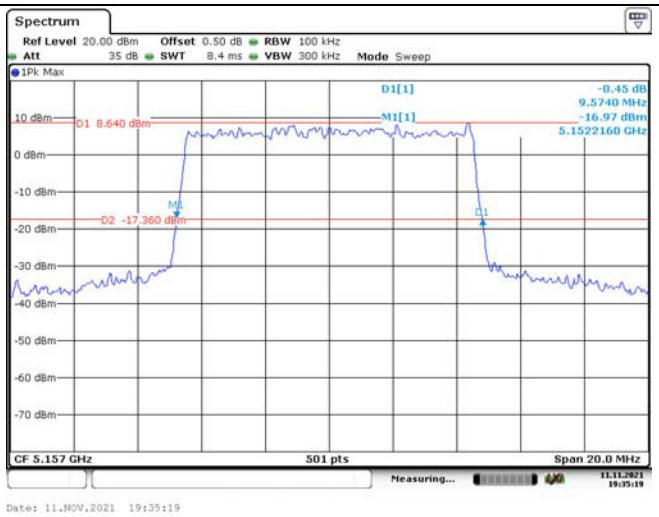
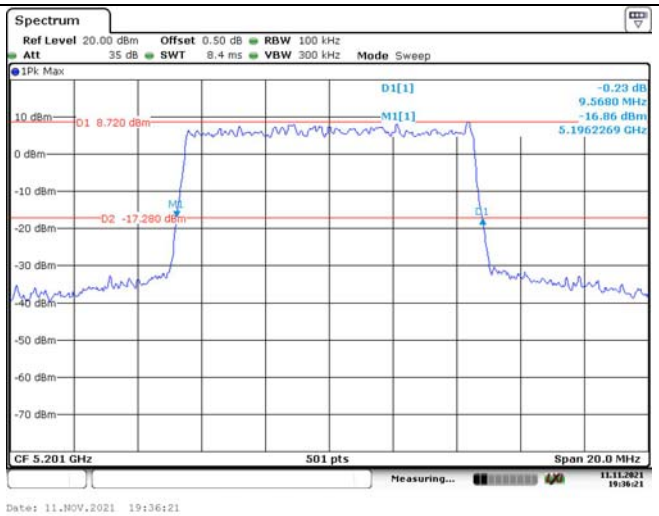
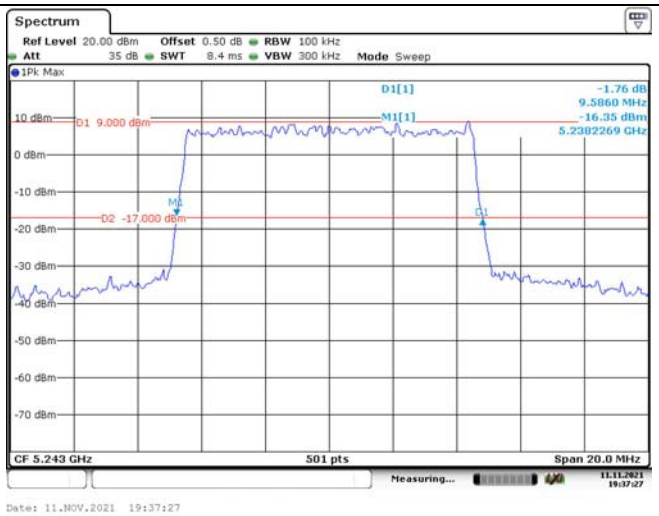
Mode	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	6 dB Emission Bandwidth Limit (MHz)	99% Occupied Bandwidth (MHz)
802.11n ht40	5755	36.320	0.5	36.886
	5795	36.320	0.5	37.046
802.11ac vht80	5775	76.800	0.5	76.008
1.4M	5728	1.181	0.5	1.138
	5789	1.177	0.5	1.138
	5847	1.177	0.5	1.138
10M	5733	9.001	0.5	8.982
	5789	9.001	0.5	8.982
	5842	9.001	0.5	8.942
20M	5738	18.003	0.5	18.124
	5790	17.945	0.5	18.124
	5839	17.887	0.5	18.124
Note: test was performed at Chain 0.				

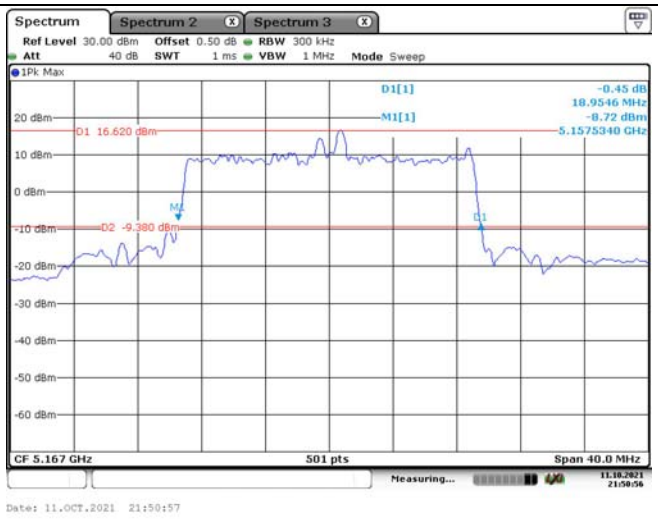
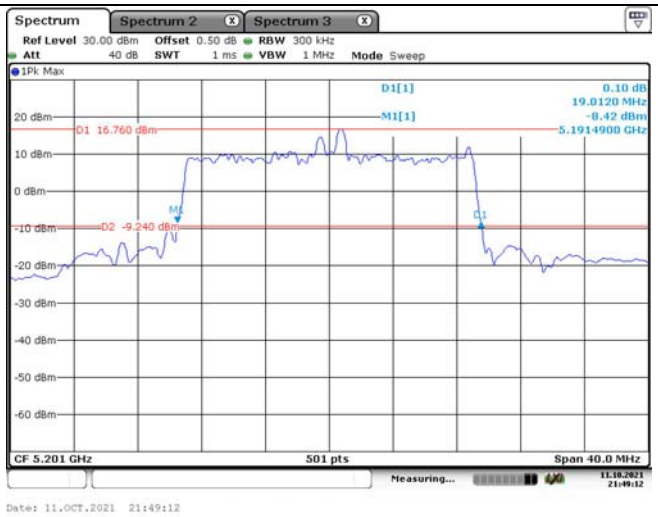
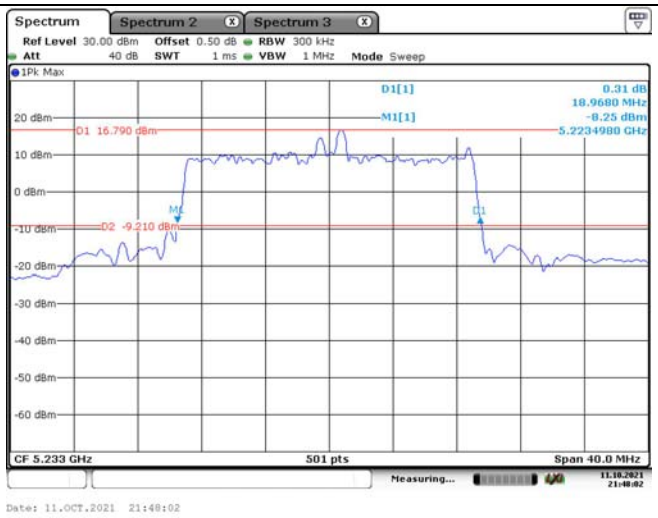
Note: the 99% Occupied Bandwidth have not fall into the band 5250-5350MHz or 5470-5725MHz, please refer to the test plots of 99% Occupied Bandwidth.

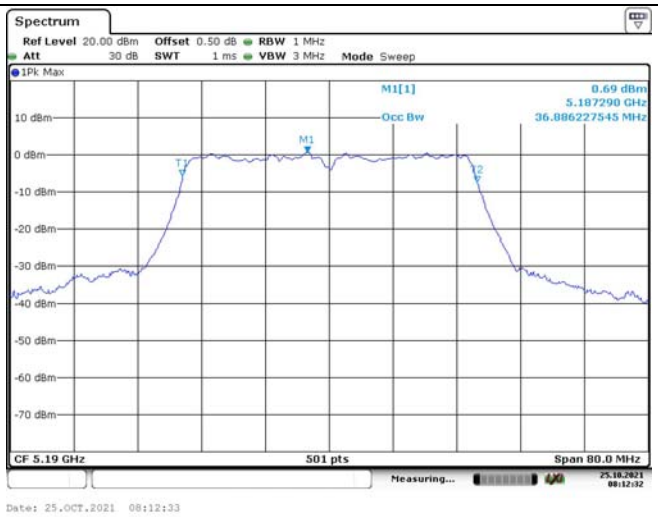
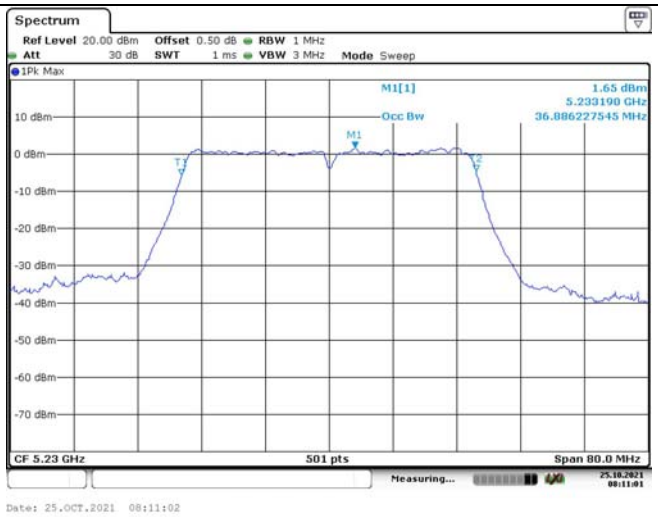
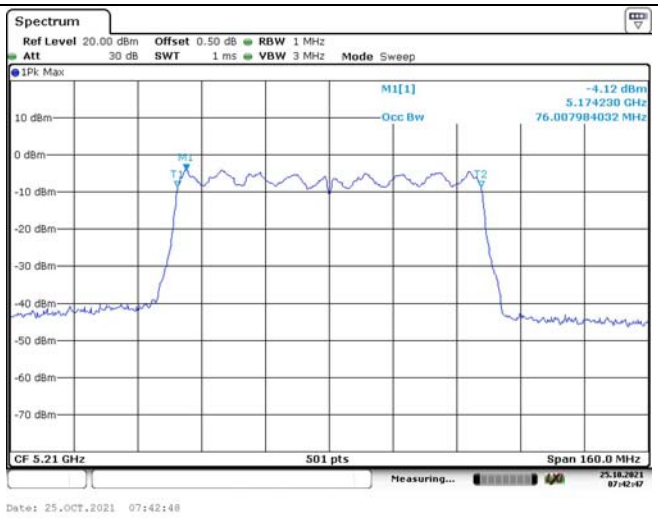
5150-5250MHz:

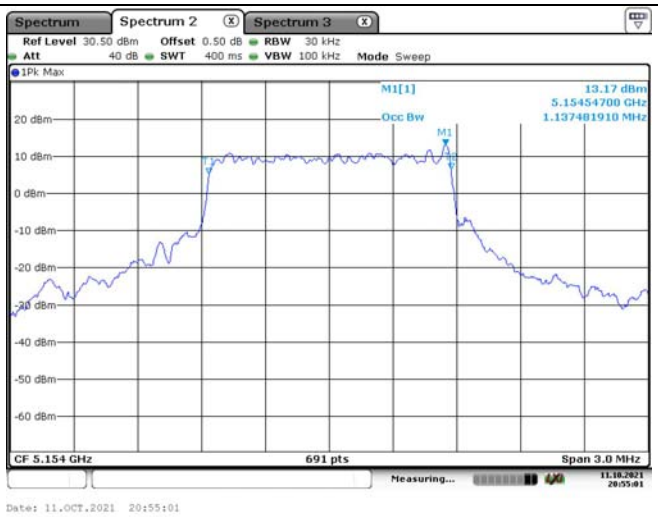
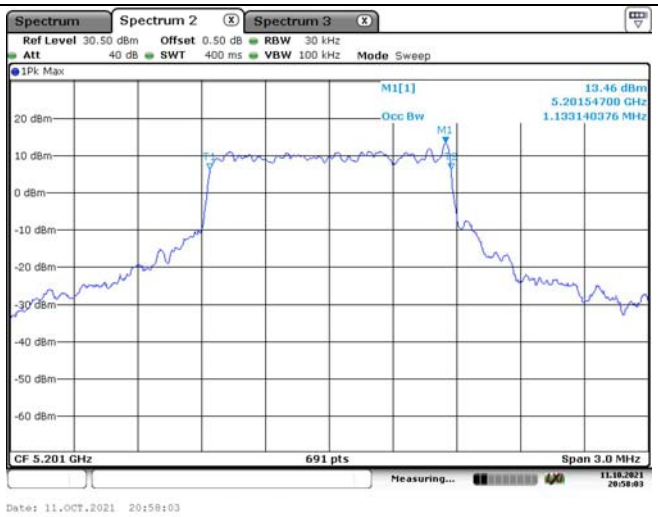
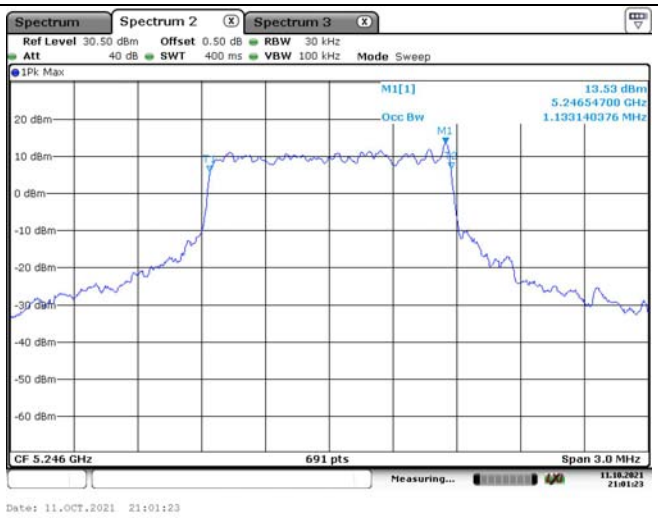
26dB Emission Bandwidth	
802.11n ht40 Lowest Channel	
802.11n ht40 Highest Channel	
802.11ac vht80 Middle Channel	

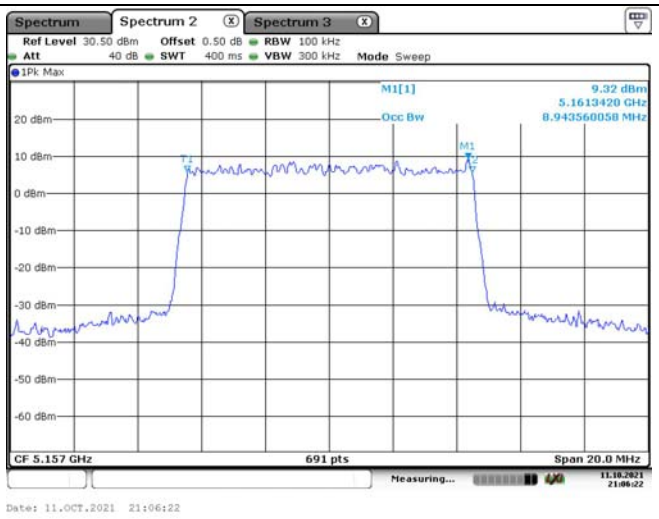
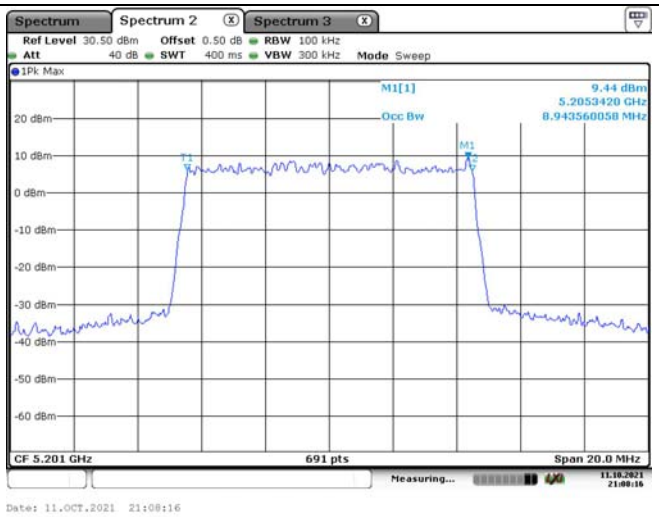
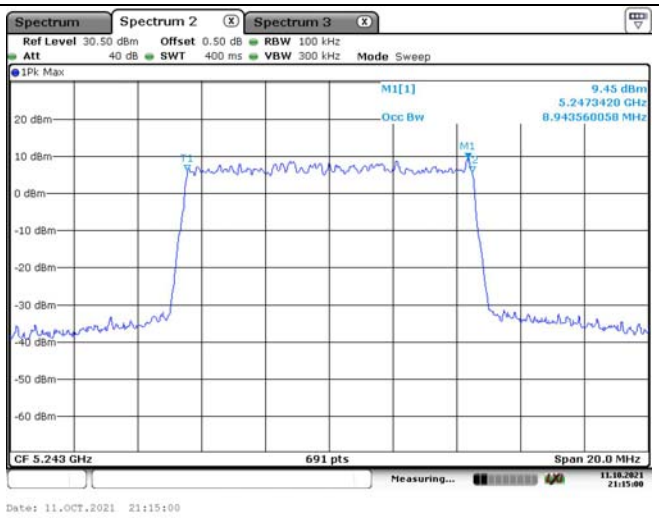
26dB Emission Bandwidth	
1.4M Lowest Channel	
1.4M Middle Channel	
1.4M Highest Channel	

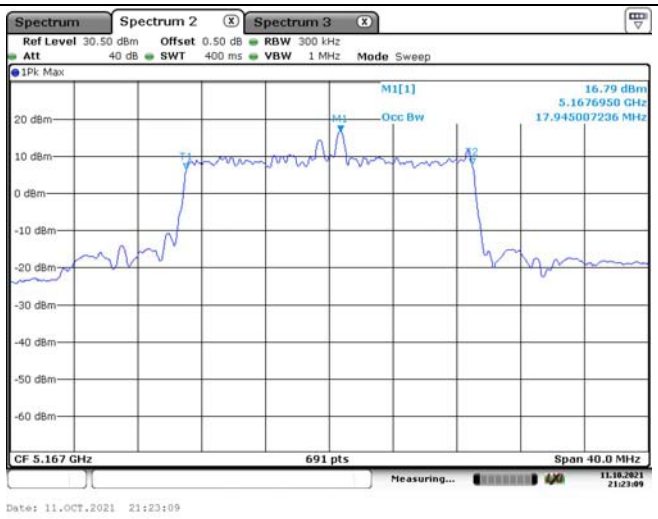
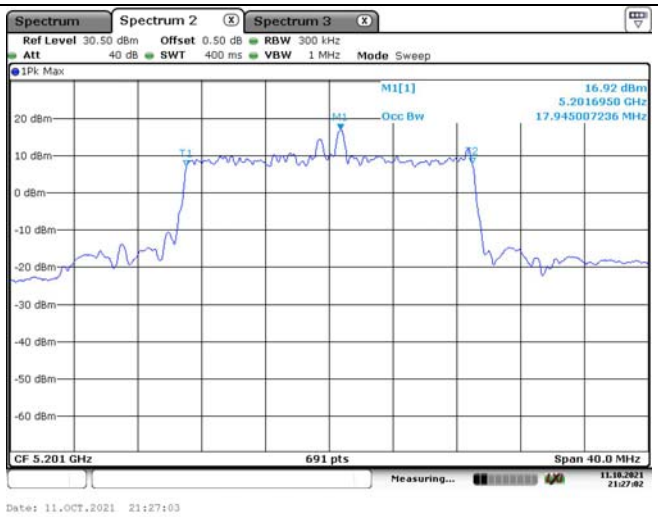
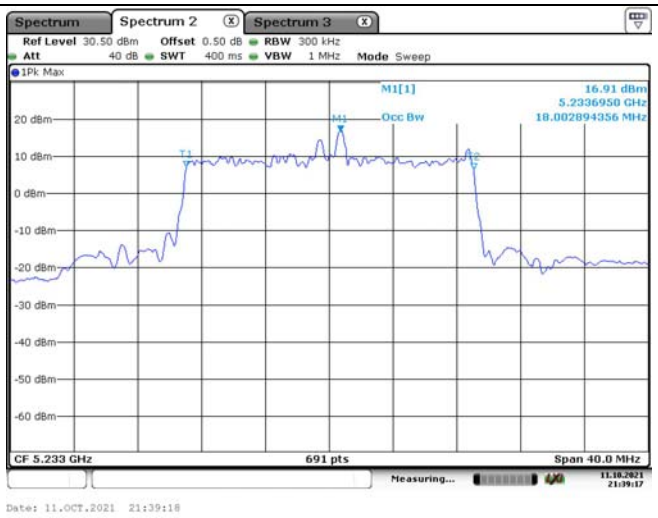
26dB Emission Bandwidth	
10M Lowest Channel	
10M Middle Channel	
10M Highest Channel	

26dB Emission Bandwidth	
20M Lowest Channel	
10M Middle Channel	
20M Highest Channel	

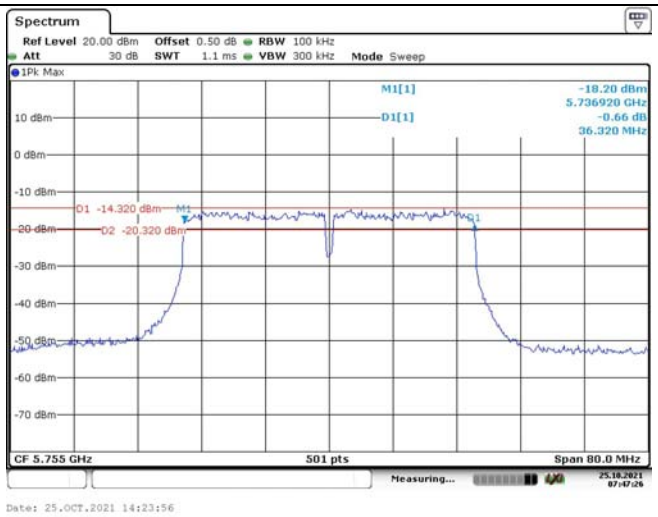
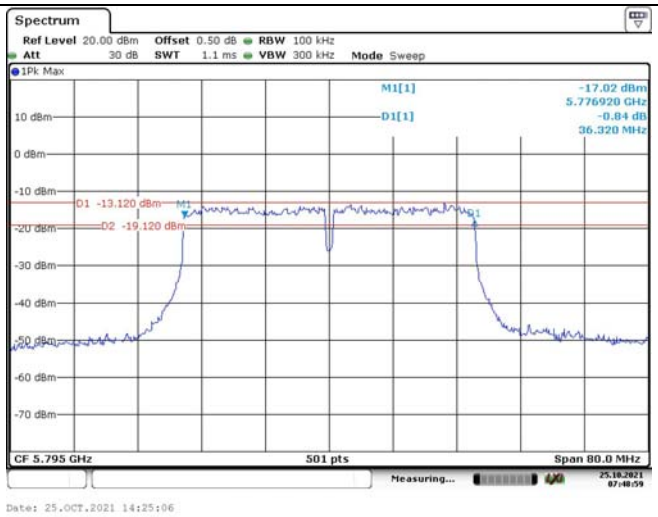
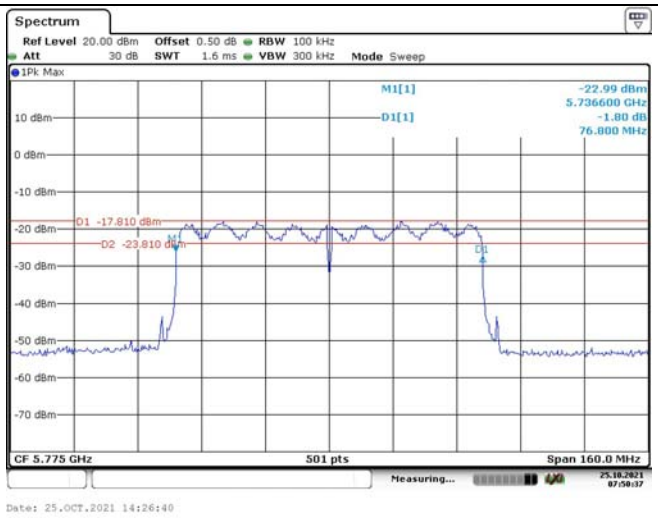
99% Emission Bandwidth	
802.11n ht40 Lowest Channel	
802.11n ht40 Highest Channel	
802.11ac vht80 Middle Channel	

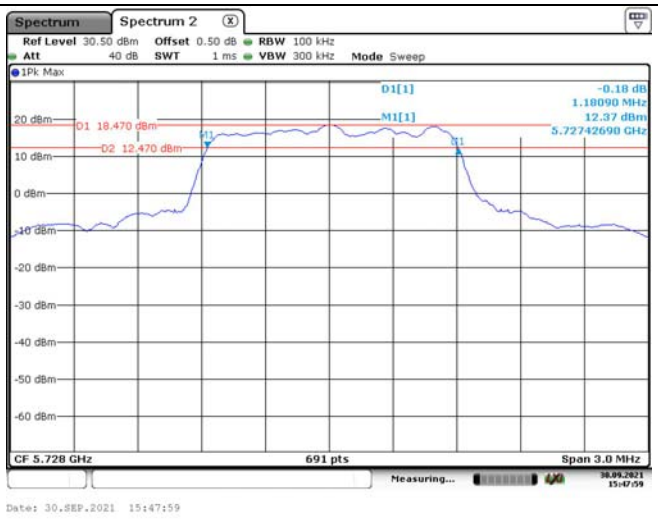
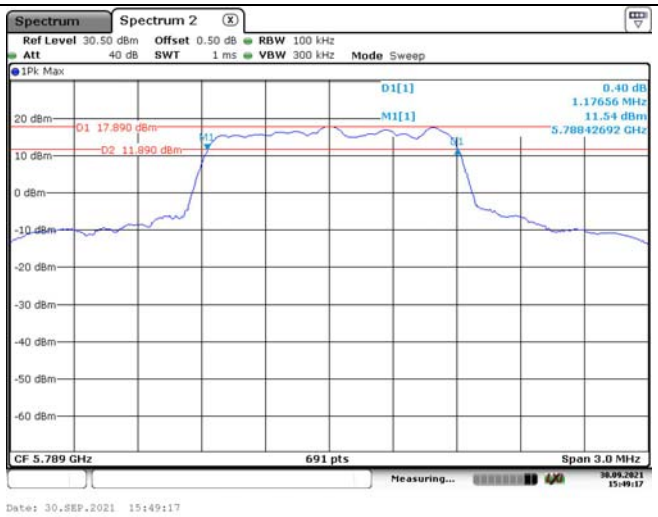
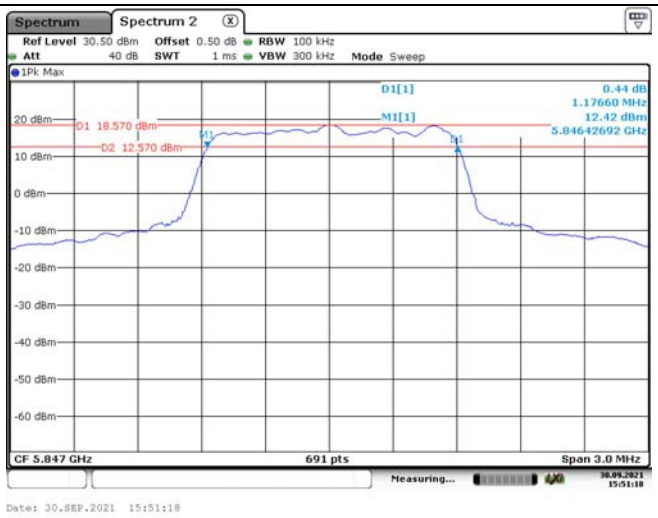
99% Emission Bandwidth	
1.4M Lowest Channel	
1.4M Middle Channel	
1.4M Highest Channel	

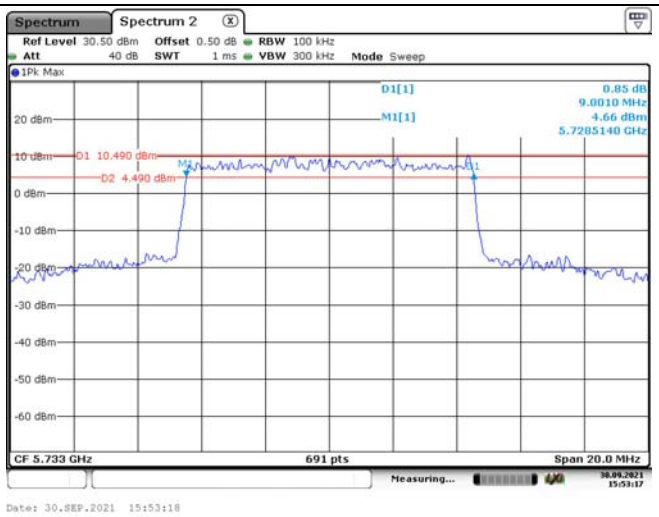
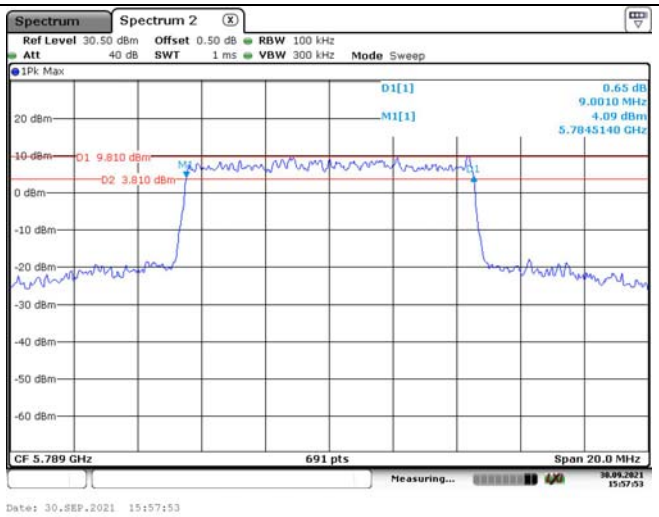
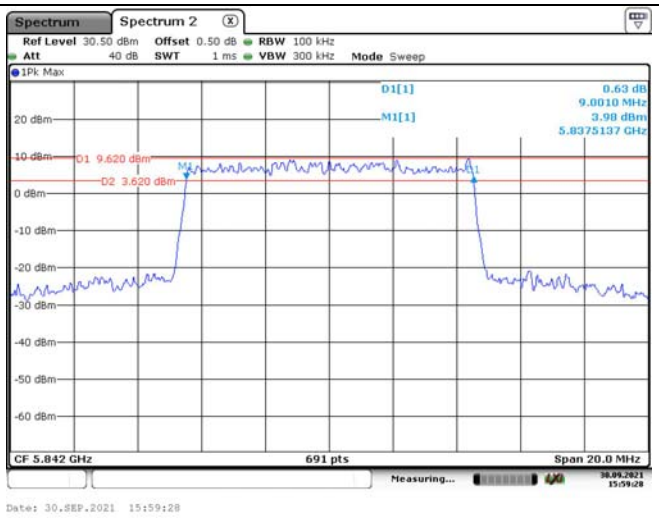
99% Emission Bandwidth	
10M Lowest Channel	
10M Middle Channel	
10M Highest Channel	

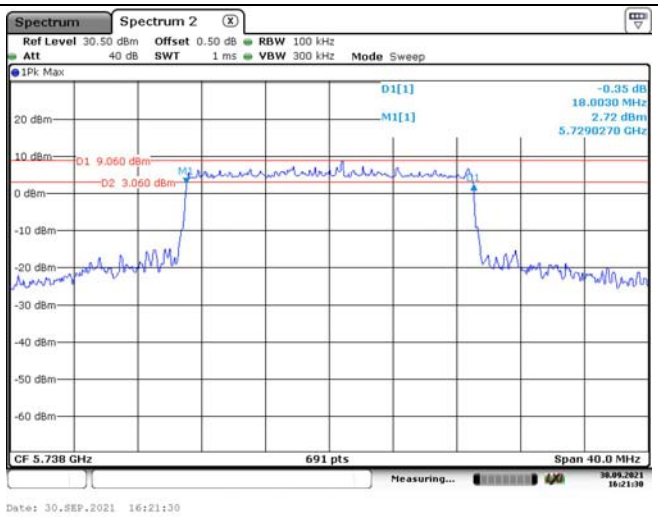
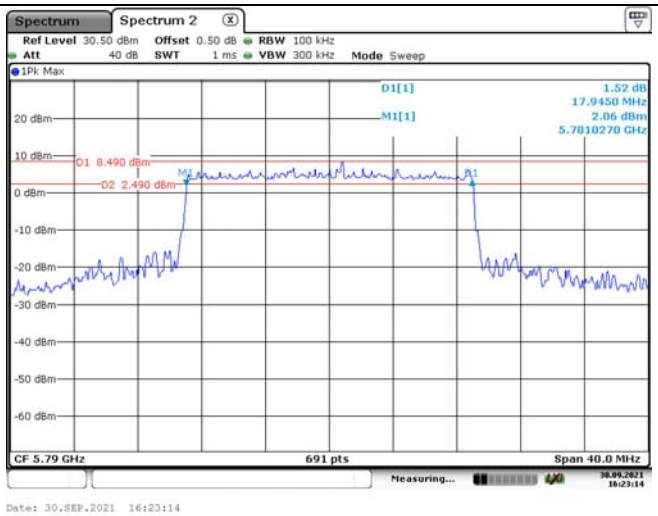
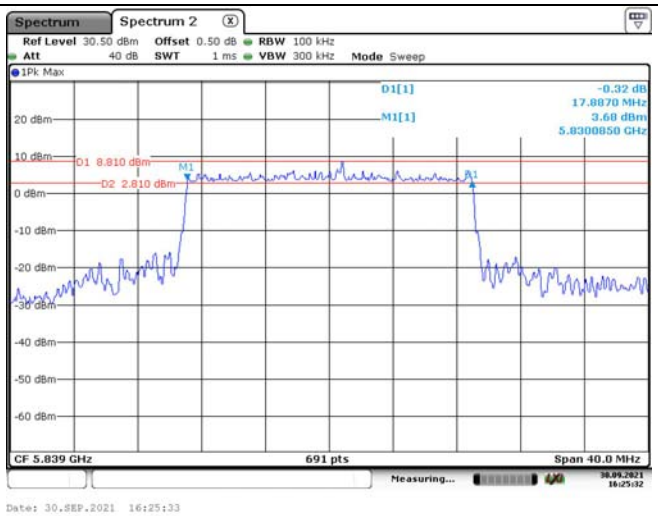
99% Emission Bandwidth	
20M Lowest Channel	
20M Middle Channel	
20M Highest Channel	

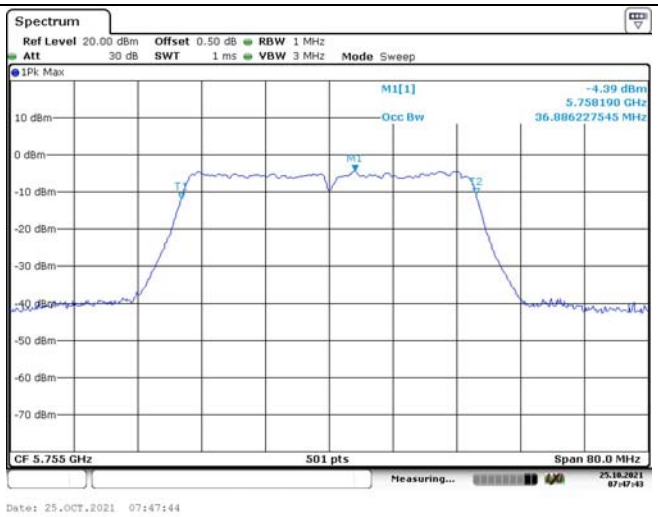
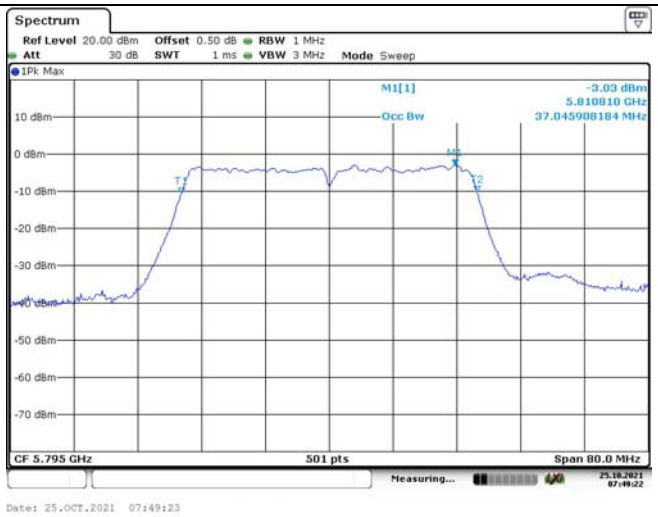
5725-5850MHz:

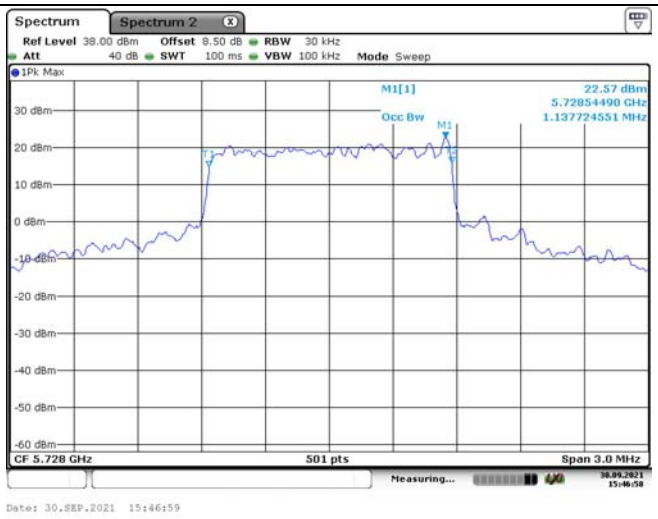
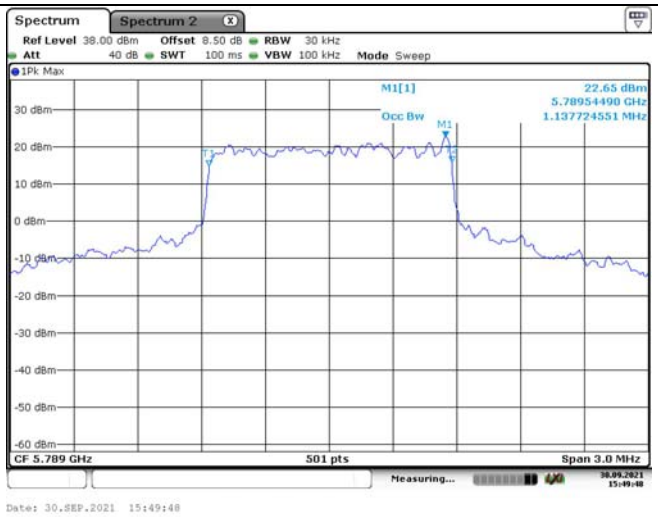
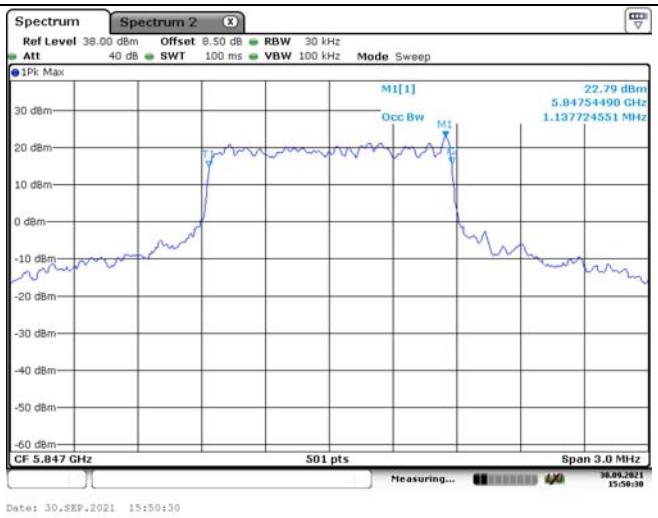
6dB Emission Bandwidth	
802.11n ht40 Lowest Channel	
802.11n ht40 Highest Channel	
802.11ac vht80 Middle Channel	

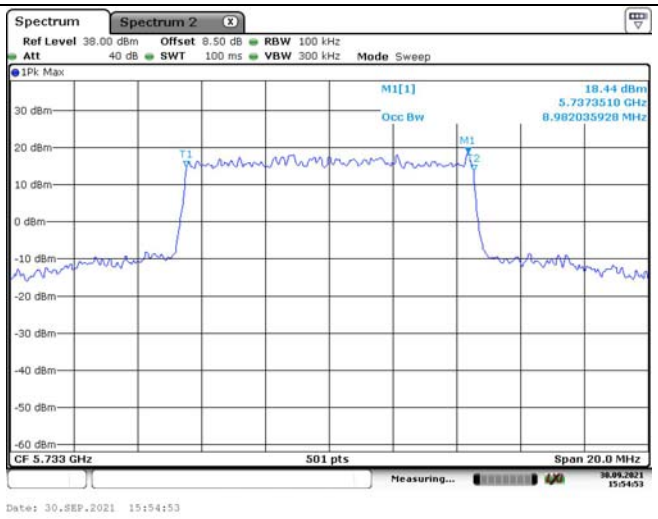
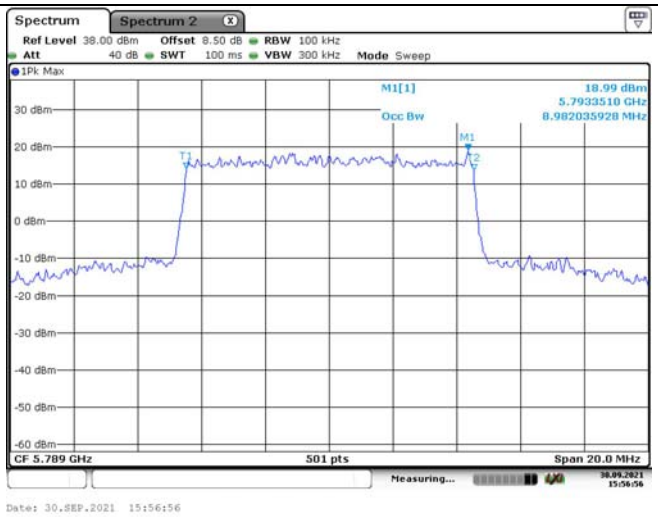
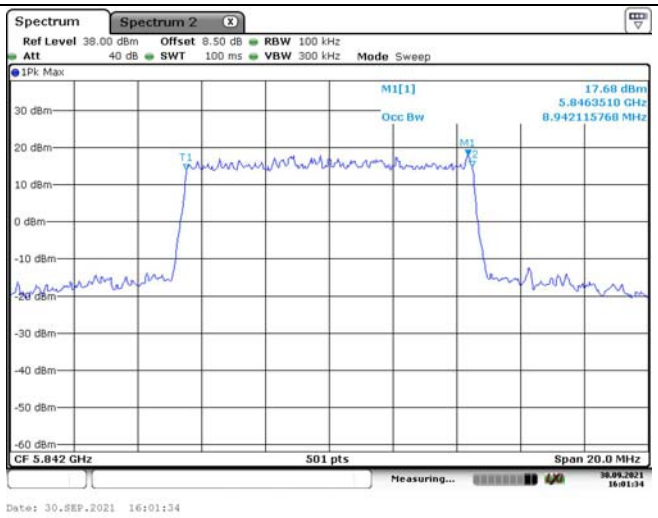
6dB Emission Bandwidth	
1.4M Lowest Channel	
1.4M Middle Channel	
1.4M Highest Channel	

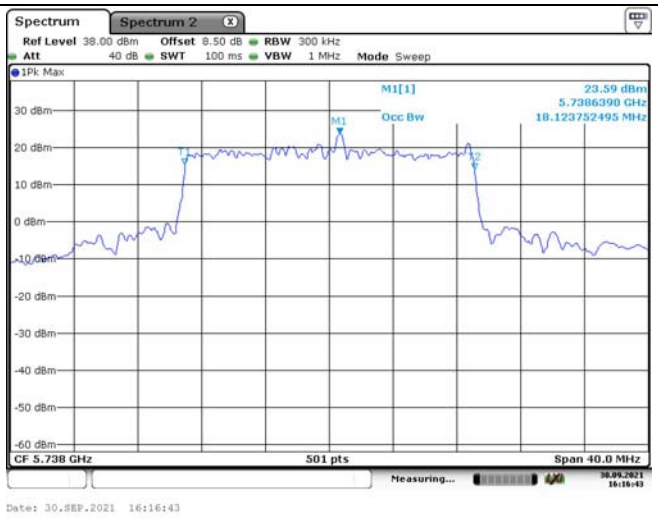
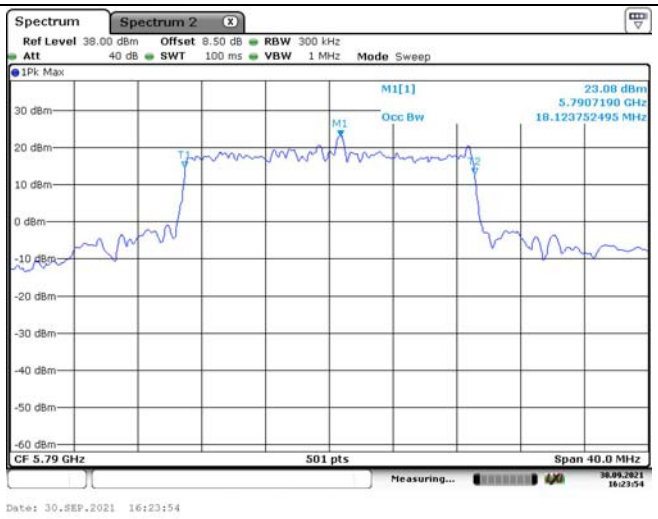
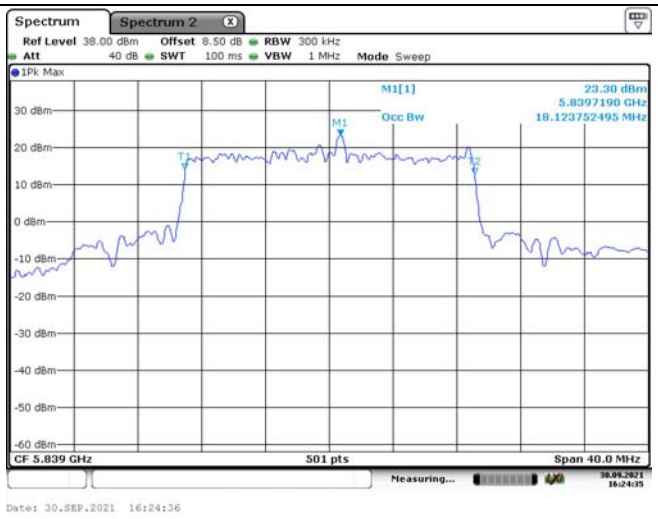
6dB Emission Bandwidth	
10M Lowest Channel	
10M Middle Channel	
10M Highest Channel	

6dB Emission Bandwidth	
20M Lowest Channel	
20M Middle Channel	
20M Highest Channel	

99% Emission Bandwidth	
802.11n ht40 Lowest Channel	
802.11n ht40 Highest Channel	
802.11ac vht80 Middle Channel	

99% Emission Bandwidth	
1.4M Lowest Channel	
1.4M Middle Channel	
1.4M Highest Channel	

99% Emission Bandwidth	
10M Lowest Channel	
10M Middle Channel	
10M Highest Channel	

99% Emission Bandwidth	
20M Lowest Channel	
20M Middle Channel	
20M Highest Channel	

4.4 Maximum Conducted Output Power:

Serial Number:	CR21090094-RF-S4	Test Date:	2021-09-30~2021-10-27
Test Site:	RF	Test Mode:	Transmitting
Tester:	Great Qiao	Test Result:	Pass

Environmental Conditions:					
Temperature: (℃)	25.4~27.4	Relative Humidity: (%)	58~73	ATM Pressure: (kPa)	100. 4~101.3

Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	USB Wideband Power Sensor	U2022XA	MY5315004	2021-09-12	2022-09-12
Unknown	Coaxial Cable	C0010	C0010/04	Each time	N/A

** Statement of Traceability: China Certification ICT Co., Ltd (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).*

Test Data:

802.11 n/ac:

5150-5250 MHz(Only for FCC):

Test Modes	Test Frequency (MHz)	Max. Conducted Average Output Power (dBm)	
		Result	FCC Limit
802.11n ht40	5190	6.14	24
	5230	7.26	24
802.11ac vht80	5210	4.83	24
Antenna Gain:	2.1	dBi	
Note: The device is a Client The duty cycle factor has been calculated into the test data.			

5725-5850 MHz:

Test Modes	Test Frequency (MHz)	Max. Conducted Average Output Power (dBm)	
		Result	Limit
802.11n ht40	5755	6.88	30
	5795	5.95	30
802.11ac vht80	5775	3.37	30
Antenna Gain:	2.1	dBi	
Note: The device is a Client The duty cycle factor has been calculated into the test data.			

1.4M/10M/20M Modes:

5150-5250 MHz(Only for FCC):

Test Modes	Test Frequency (MHz)	Max. Conducted Average Output Power (dBm)			
		Chain 0	Chain 1	Total	Limit
1.4M	5154	9.88	9.56	12.73	24
	5201	9.87	9.87	12.88	24
	5246	9.54	9.66	12.61	24
10M	5157	9.21	9.21	12.22	24
	5201	9.02	9.03	12.04	24
	5243	9.03	9.35	12.2	24
20M	5167	9.36	9.65	12.52	24
	5201	9.33	9.87	12.62	24
	5233	9.25	9.2	12.24	24
Note: The device employed Cyclic Delay Diversity (CDD) for 802.11 MIMO transmitting, per KDB 662911 D01 Multiple Transmitter Output v02r01, for power measurements on IEEE 802.11 devices: Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leqslant 4$					
Antenna Gain:	2.1	dBi	Directional gain:	2.1	dBi

Note:
The device is a Client unit.
The duty cycle factor has been calculated into the test data.

5725-5850 MHz:

Test Modes	Test Frequency (MHz)	Max. Conducted Average Output Power (dBm)			
		Chain 0	Chain 1	Total	Limit
1.4M	5728	20.11	20.54	23.34	30
	5789	19.68	20.16	22.94	30
	5847	19.55	20.18	22.89	30
10M	5733	19.05	20.66	22.94	30
	5789	19.56	20.22	22.91	30
	5842	19.77	20.69	23.26	30
20M	5738	19.59	20.19	22.91	30
	5790	19.45	20.66	23.11	30
	5839	19.58	20.56	23.11	30
Note: The device employed Cyclic Delay Diversity (CDD) for 802.11 MIMO transmitting, per KDB 662911 D01 Multiple Transmitter Output v02r01, for power measurements on IEEE 802.11 devices: Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leqslant 4$					
Antenna Gain:	2.1	dBi	Directional gain:	2.1	dBi

Note:
The device is a Client unit.
The duty cycle factor has been calculated into the test data.

4.5 Maximum power spectral density:

Serial Number:	CR21090094-RF-S4	Test Date:	2021-10-25~2021-11-08
Test Site:	RF	Test Mode:	Transmitting
Tester:	Great Qiao	Test Result:	Pass

Environmental Conditions:					
Temperature: (℃)	25.4~27.6	Relative Humidity: (%)	53~73	ATM Pressure: (kPa)	100. 4~101.3

Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSV40	101474	2021-07-22	2022-07-21
Unknown	Coaxial Cable	C-SJ0010	C0010	Each time	N/A

** Statement of Traceability: China Certification ICT Co., Ltd (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).*

Test Data:

802.11 n/ac:

5150-5250 MHz(Only for FCC):

Test Modes	Test Frequency (MHz)	Maximum Power Spectral Density (dBm/MHz)	
		Result	FCC Limit
802.11n ht40	5190	-3.00	11
	5230	-1.93	11
802.11ac vht80	5210	-8.25	11
Antenna Gain:	2.1	dBi	
Note: The device is a Client. The duty cycle factor has been calculated into the test data.			

5725-5850 MHz:

Test Modes	Test Frequency (MHz)	Reading (dBm/300kHz)	Maximum Power Spectral Density (dBm/500kHz)	
			Result	Limit
802.11n ht40	5755	-10.91	-8.69	30
	5795	-9.74	-7.52	30
802.11ac vht80	5775	-15.21	-12.99	30
Antenna Gain:	2.1	dBi		
Note: The duty cycle factor has been calculated into the test data. If measurement bandwidth of Maximum PSD is specified in 500 kHz, add 10log(500kHz/RBW)to the measured result, whereas RBW (< 500 KHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.				

1.4M/10M/20M Modes:

5150-5250 MHz(Only for FCC):

Test Modes	Test Frequency (MHz)	Maximum Power Spectral Density (dBm/MHz)			
		Chain 0	Chain 1	Total	Limit
1.4M	5154	7.33	7.17	10.26	11
	5201	7.17	7.24	10.22	11
	5246	6.98	7.11	10.06	11
10M	5157	-1.15	-1.23	1.82	11
	5201	-1.22	-1.10	1.85	11
	5243	-1.28	-1.17	1.79	11
20M	5167	-4.23	-4.12	-1.16	11
	5201	-4.21	-4.17	-1.18	11
	5233	-4.34	-4.32	-1.32	11
The device employed Cyclic Delay Diversity (CDD) for 802.11 MIMO transmitting, per KDB 662911 D01 Multiple Transmitter Output v02r01, for power spectral density (PSD) measurements on the devices: Array Gain = 10 log(N_{ANT}/N_{SS}) dB					
Antenna Gain:	2.1	dBi	Directional gain:	5.1	dBi

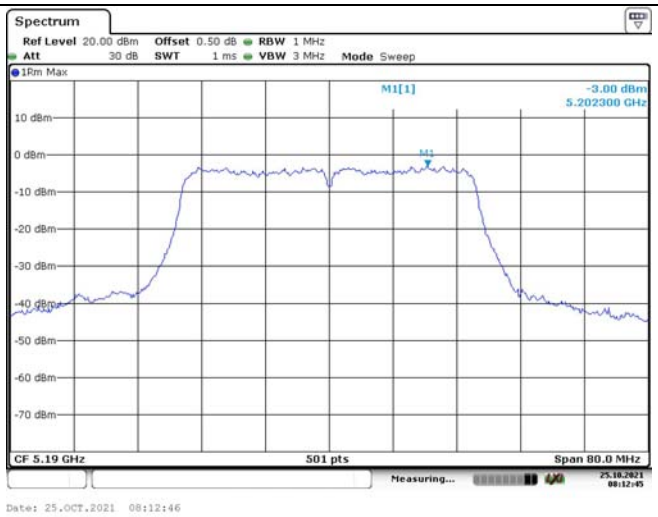
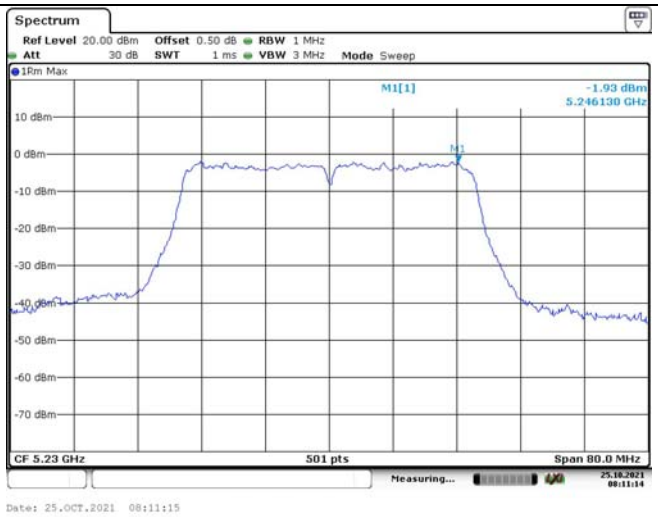
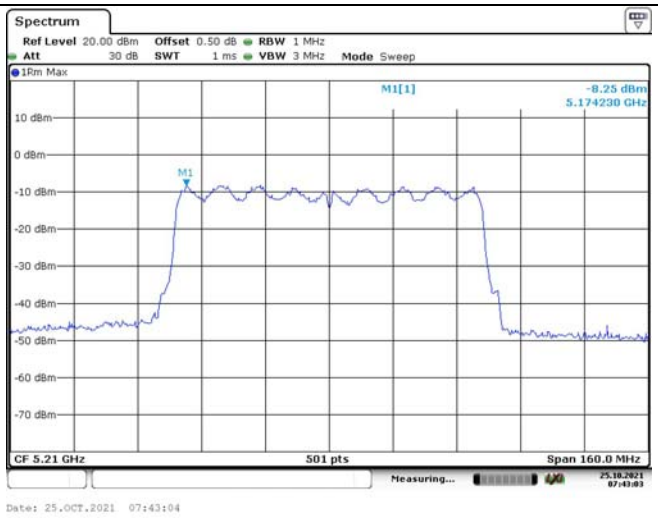
Note:
The device is a Client unit.
The duty cycle factor has been calculated into the test data.

5725-5850 MHz:

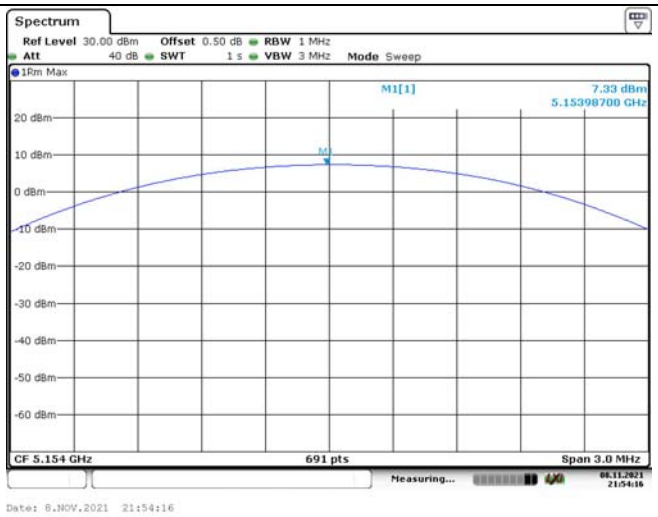
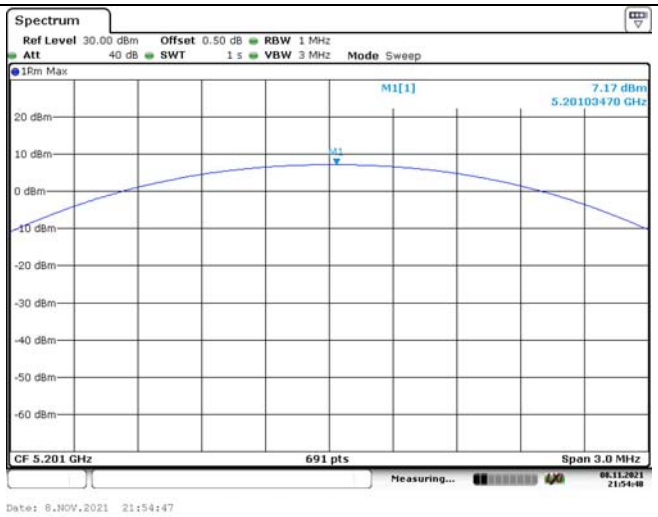
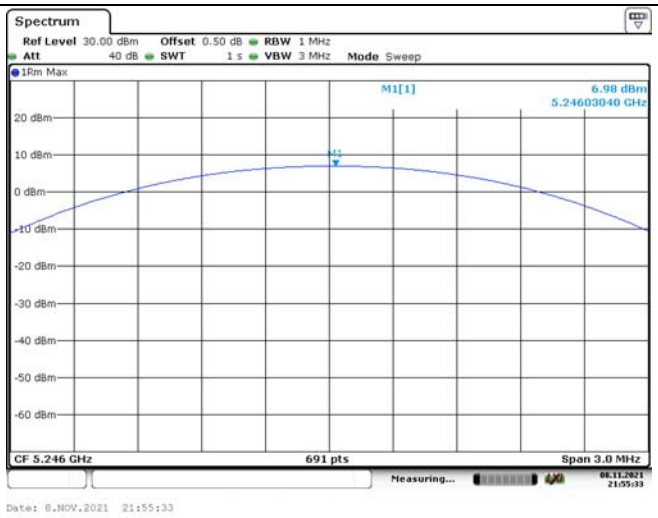
Test Modes	Test Frequency (MHz)	Maximum Power Spectral Density (dBm/500kHz)			
		Chain 0	Chain 1	Total	Limit
1.4M	5728	15.89	16.39	19.16	30
	5789	15.91	16.50	19.23	30
	5847	15.31	16.68	19.06	30
10M	5733	6.49	7.39	9.97	30
	5789	6.58	7.15	9.88	30
	5842	5.96	7.57	9.85	30
20M	5738	3.54	4.20	6.89	30
	5790	3.40	4.42	6.95	30
	5839	3.09	4.21	6.7	30
The device employed Cyclic Delay Diversity (CDD) for 802.11 MIMO transmitting, per KDB 662911 D01 Multiple Transmitter Output v02r01, for power spectral density (PSD) measurements on the devices: Array Gain = 10 log(N_{ANT}/N_{SS}) dB					
Antenna Gain:	2.1	dBi	Directional gain:	5.1	dBi

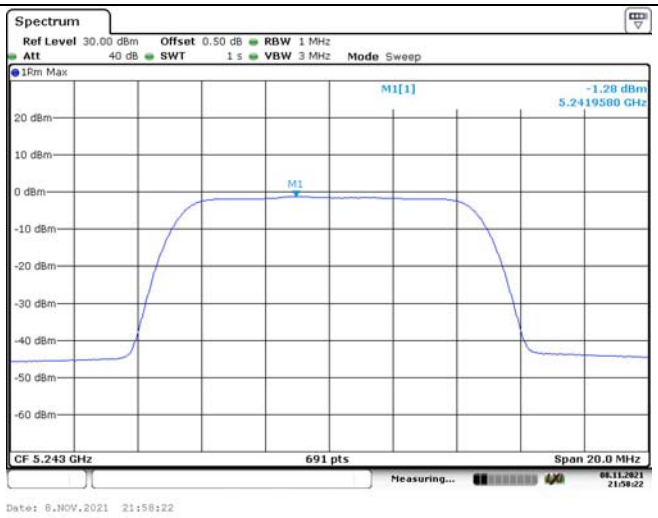
Note:
The device is a Client unit.
The duty cycle factor has been calculated into the test data.

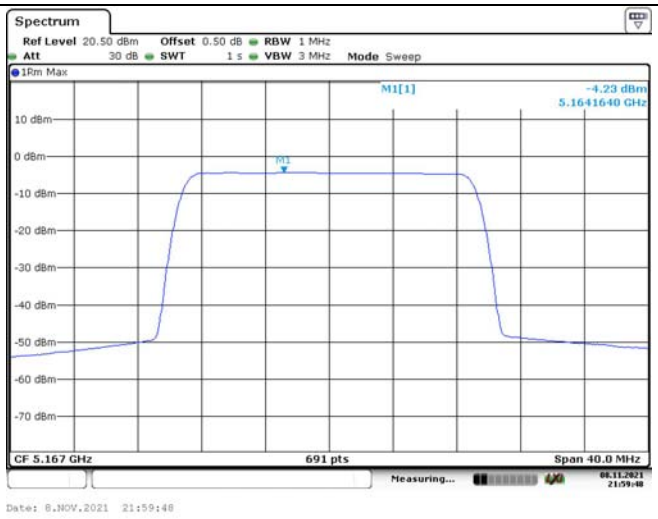
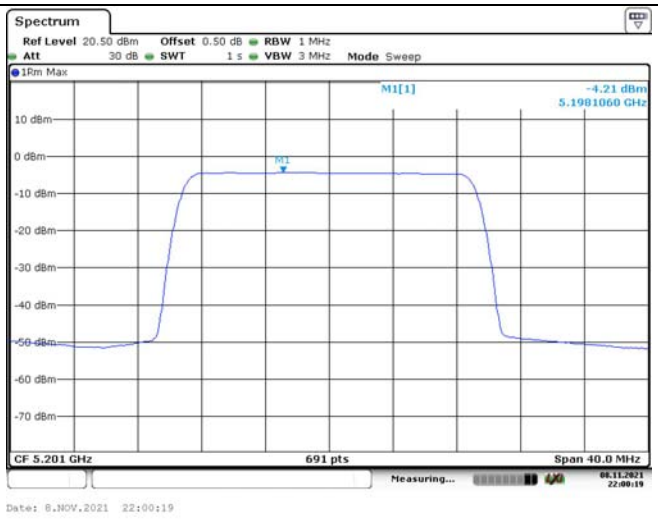
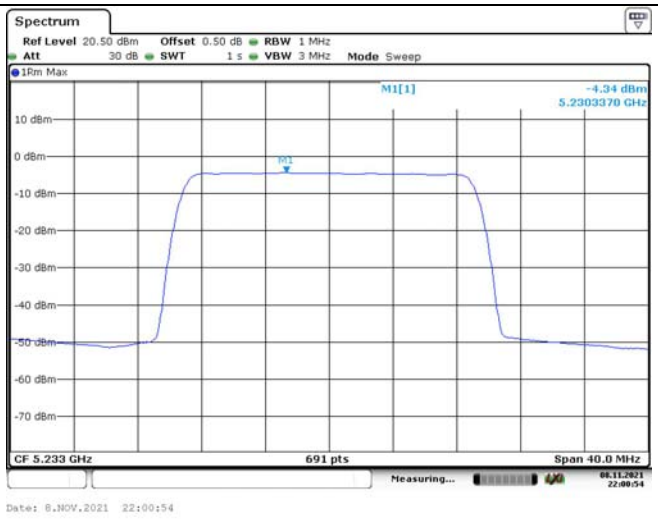
5150-5250MHz:

Maximum power spectral density	
802.11n ht40 Lowest Channel	
802.11n ht40 Highest Channel	
802.11ac vht80 Middle Channel	

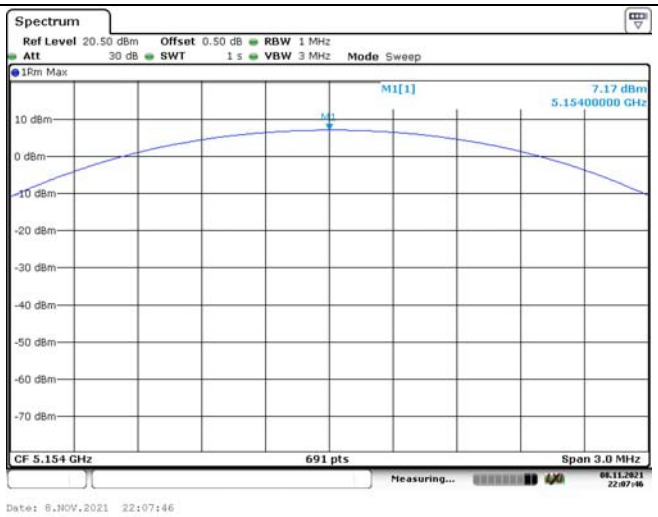
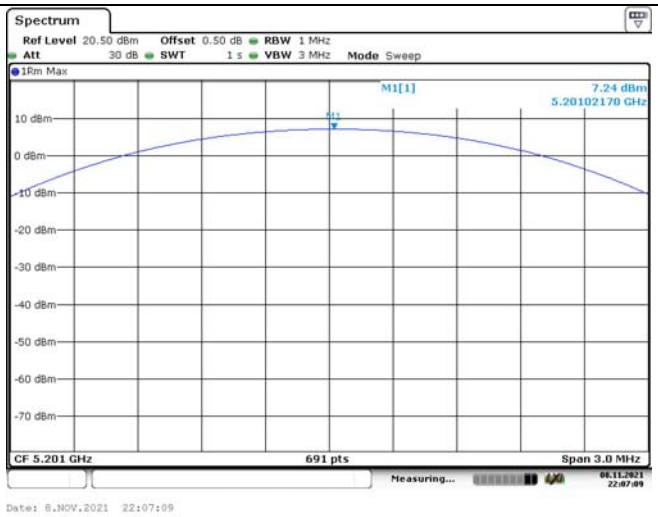
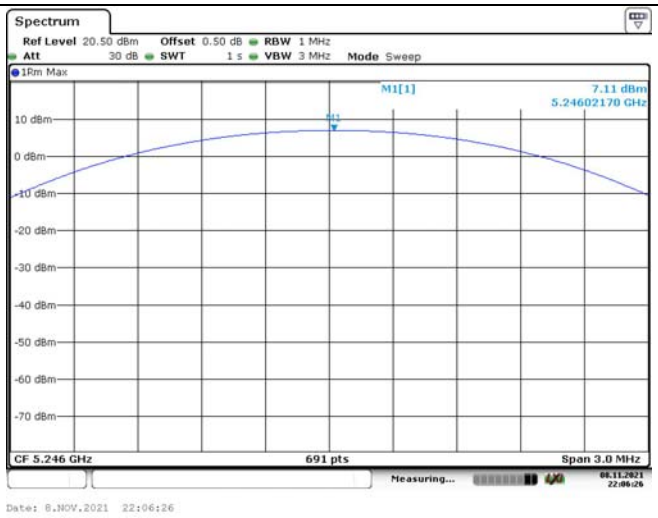
Chain 0

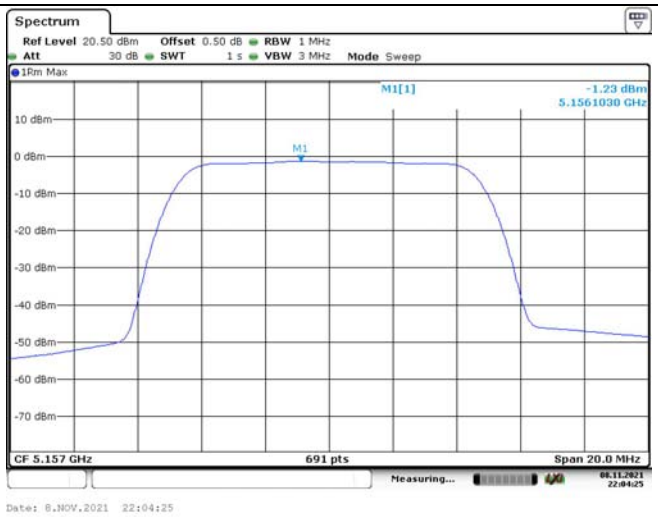
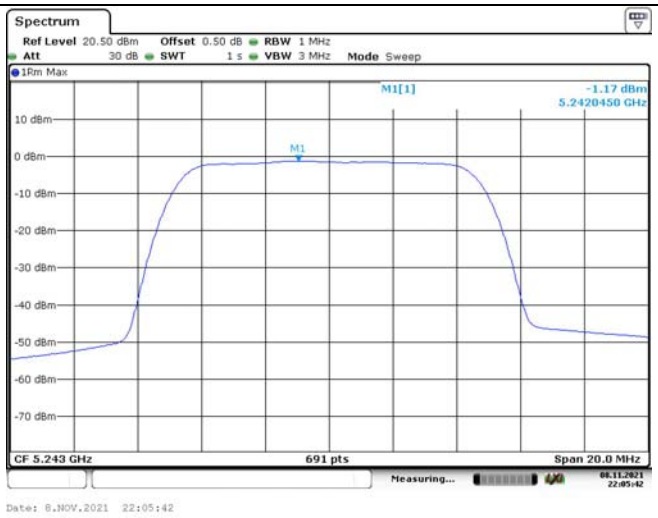
Maximum power spectral density	
1.4M Lowest Channel	
1.4M Middle Channel	
1.4M Highest Channel	

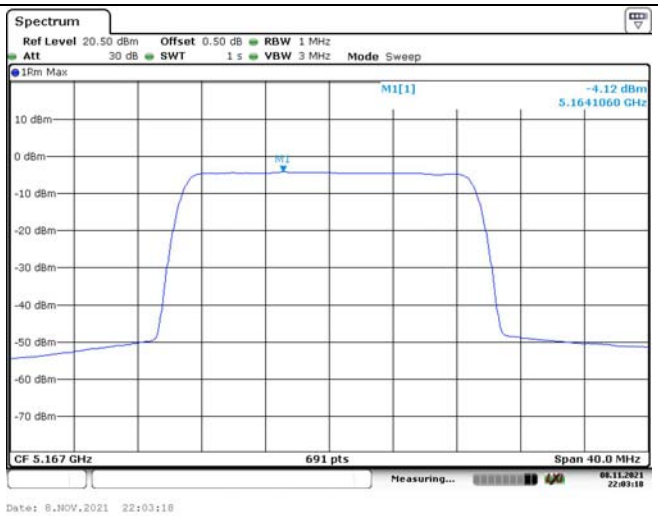
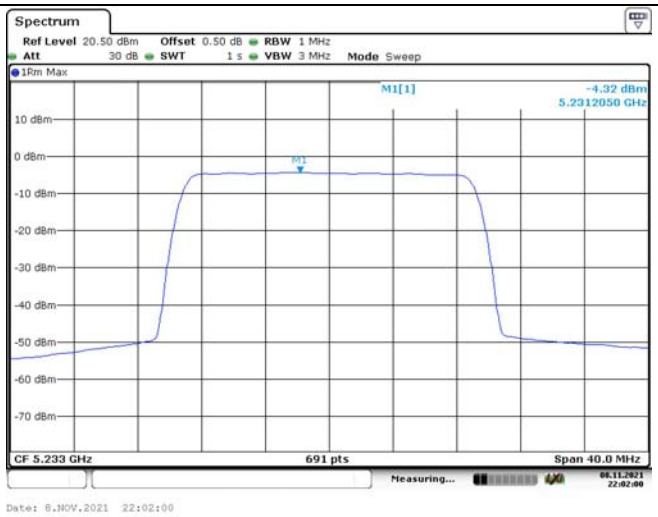
Maximum power spectral density	
10M Lowest Channel	
10M Middle Channel	
10M Highest Channel	

Maximum power spectral density	
20M Lowest Channel	
20M Middle Channel	
20M Highest Channel	

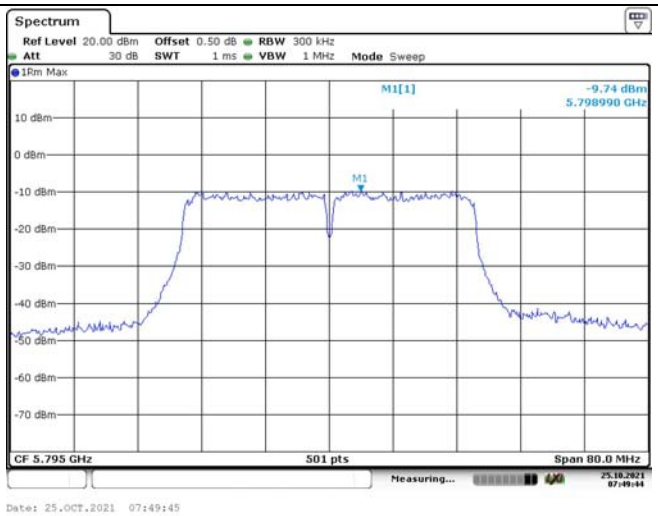
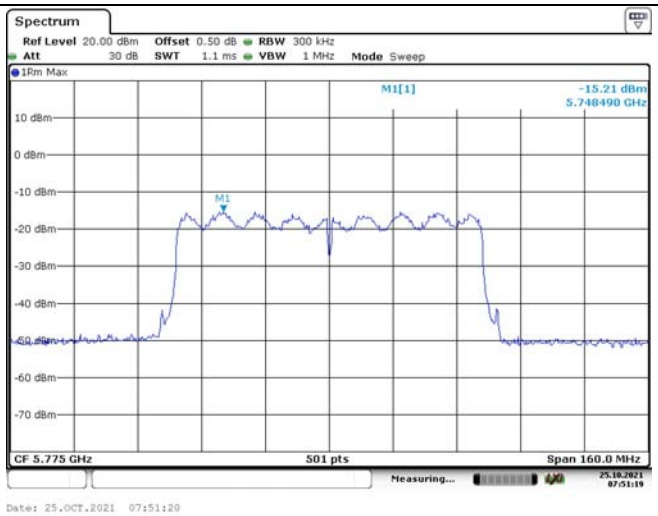
Chain 1

Maximum power spectral density	
1.4M Lowest Channel	
1.4M Middle Channel	
1.4M Highest Channel	

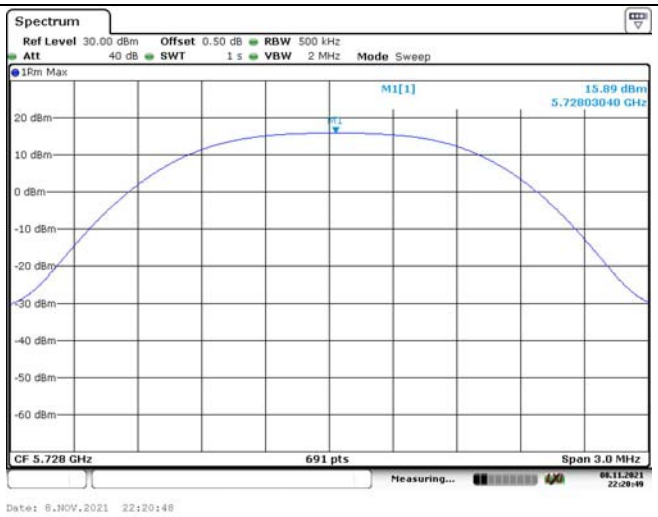
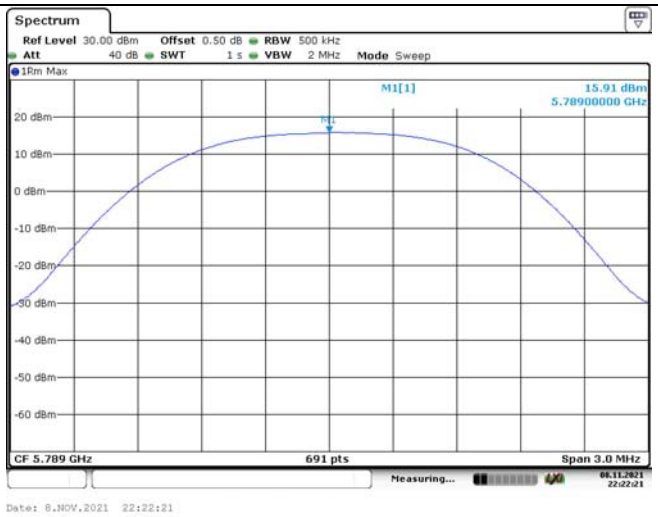
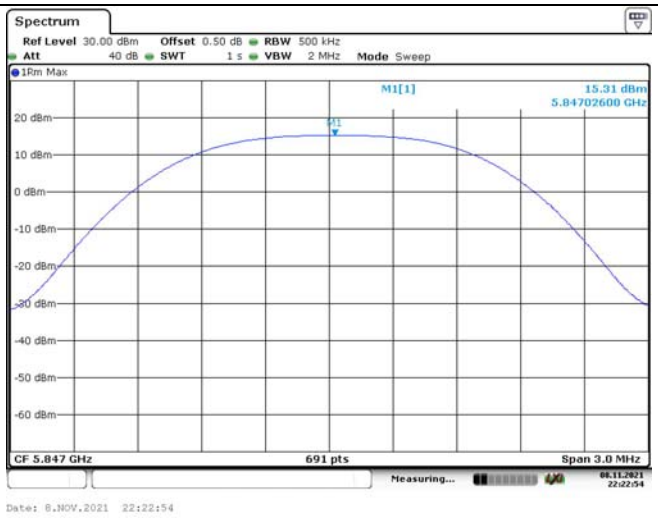
Maximum power spectral density	
10M Lowest Channel	
10M Middle Channel	
10M Highest Channel	

Maximum power spectral density	
20M Lowest Channel	
20M Middle Channel	
20M Highest Channel	

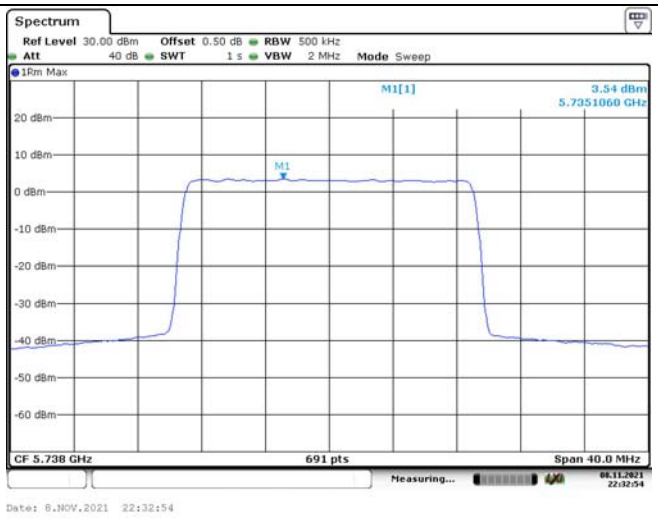
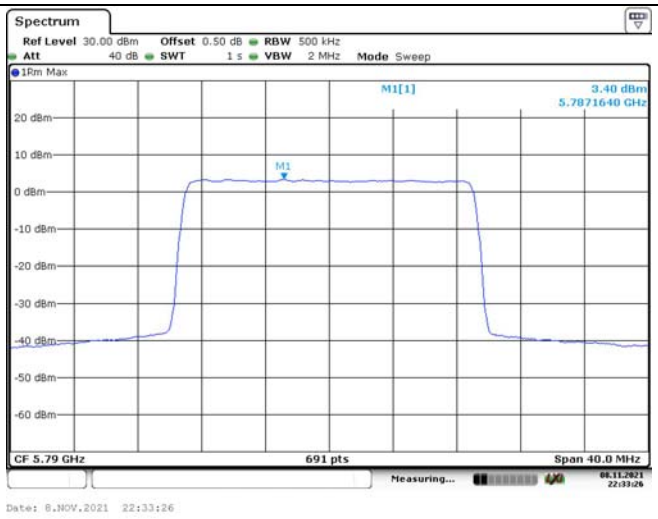
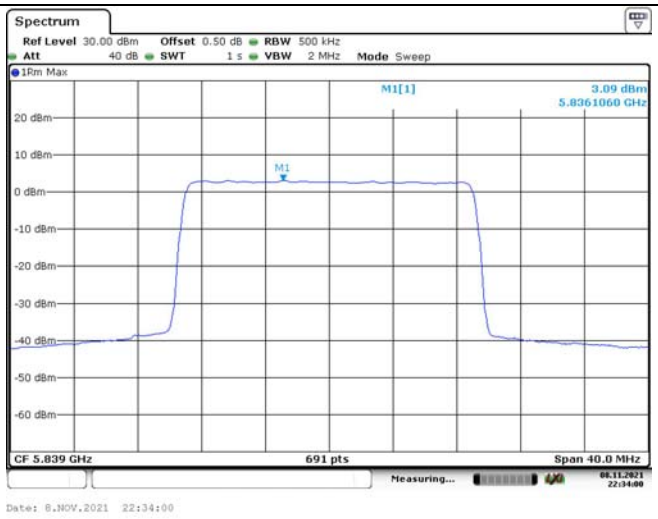
5725-5850MHz

Maximum power spectral density	
802.11n ht40 Lowest Channel	
802.11n ht40 Highest Channel	
802.11ac vht80 Middle Channel	

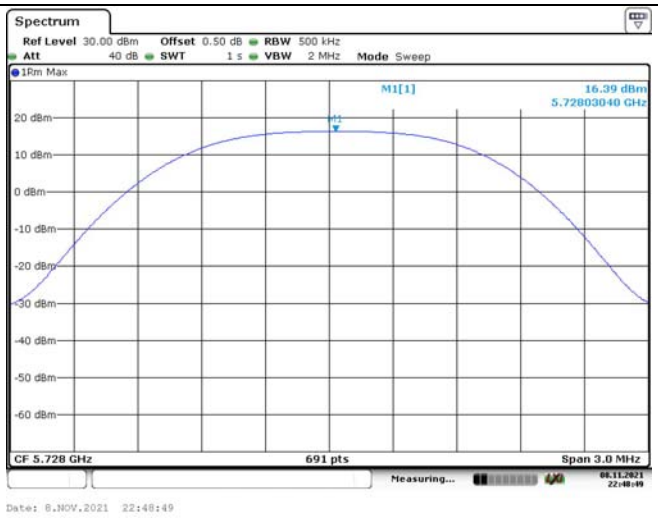
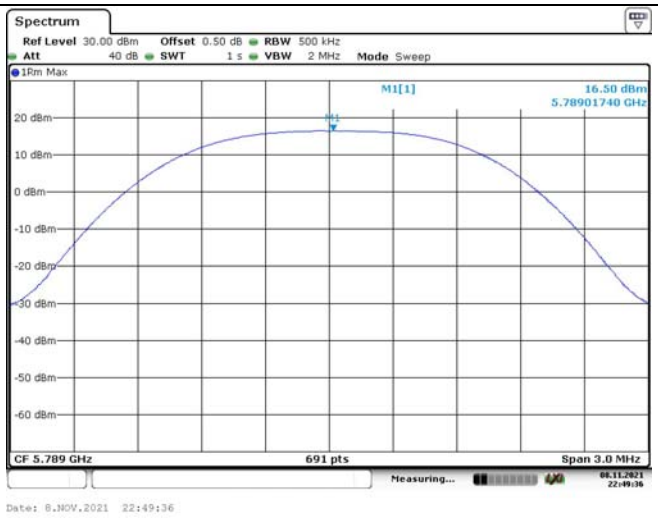
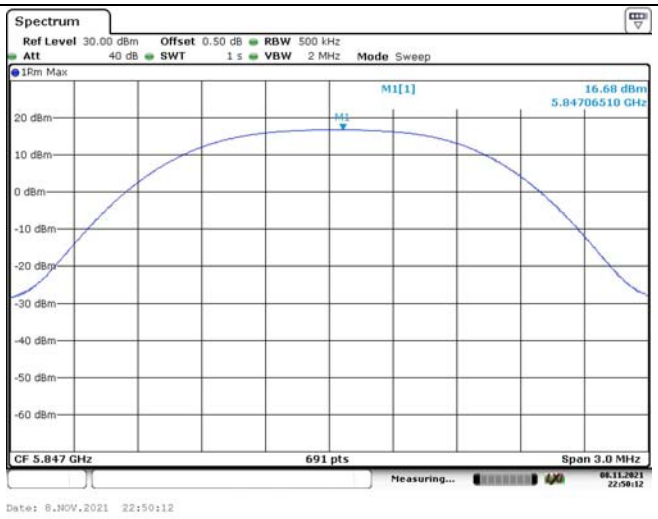
Chain 0

Maximum power spectral density	
1.4M Lowest Channel	
1.4M Middle Channel	
1.4M Highest Channel	

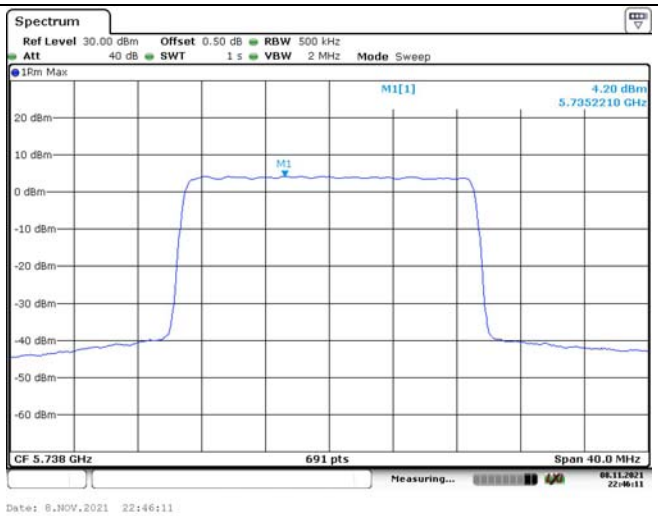
Maximum power spectral density	
10M Lowest Channel	
10M Middle Channel	
10M Highest Channel	

Maximum power spectral density	
20M Lowest Channel	
20M Middle Channel	
20M Highest Channel	

Chain 1

Maximum power spectral density	
1.4M Lowest Channel	
1.4M Middle Channel	
1.4M Highest Channel	

Maximum power spectral density	
10M Lowest Channel	
10M Middle Channel	
10M Highest Channel	

Maximum power spectral density	
20M Lowest Channel	
20M Middle Channel	
20M Highest Channel	

4.6 Duty Cycle:

Serial Number:	CR21090094-RF-S4	Test Date:	2021-09-30~2021-10-27
Test Site:	RF	Test Mode:	Transmitting
Tester:	Great Qiao	Test Result:	N/A

Environmental Conditions:					
Temperature: (℃)	25.4~27.4	Relative Humidity: (%)	58~73	ATM Pressure: (kPa)	100. 4~101.3

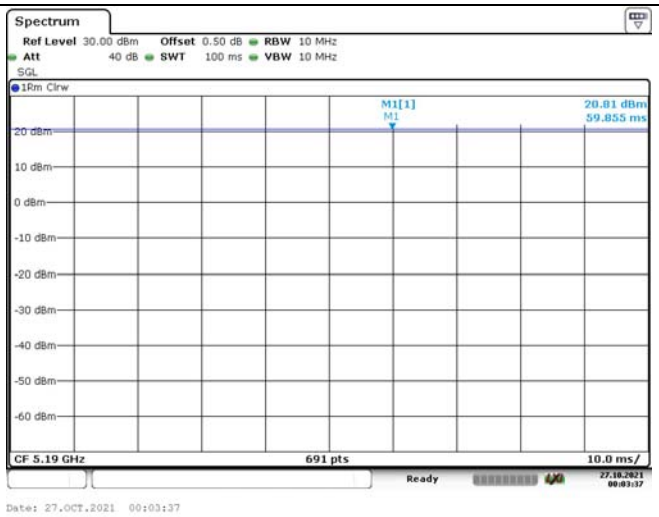
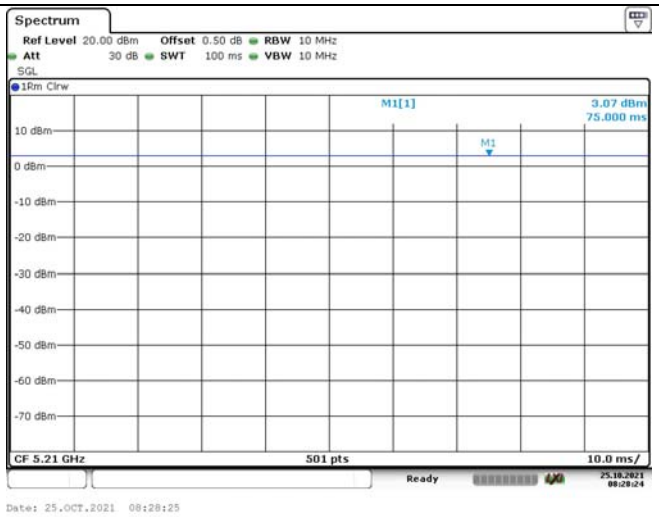
Test Equipment List and Details:

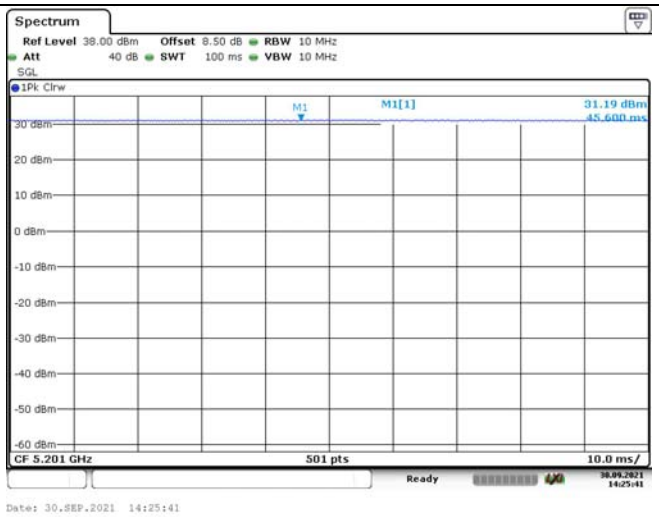
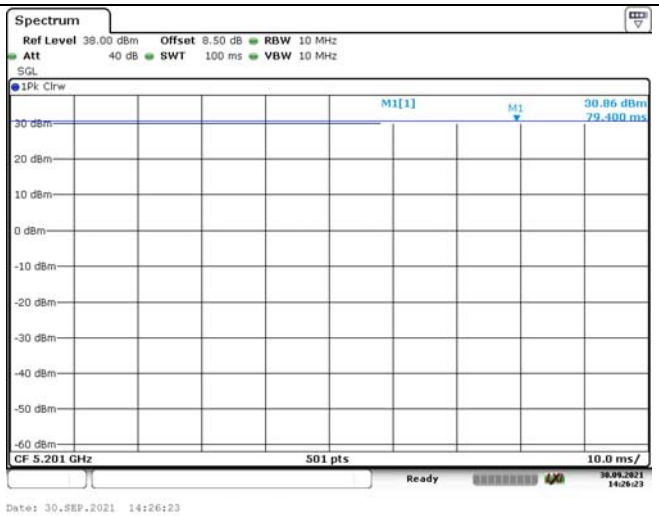
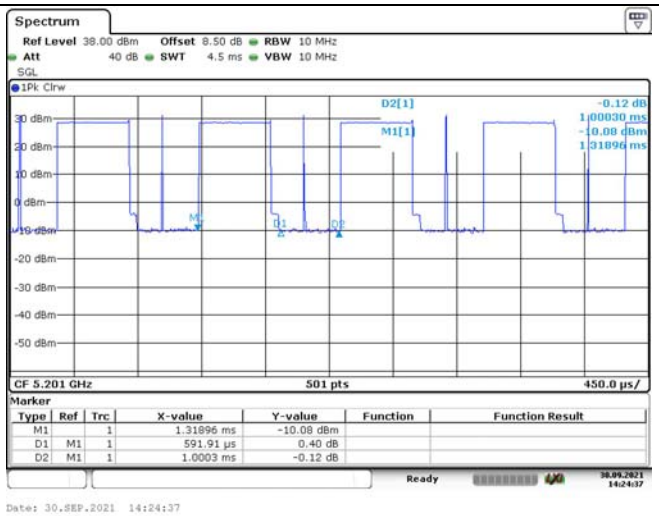
Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSV40	101474	2021-07-22	2022-07-21
Unknown	Coaxial Cable	C-SJ0010	C0010	Each time	N/A

** Statement of Traceability: China Certification ICT Co., Ltd (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).*

Test Data:

Test mode	T_{on} (ms)	T_{on+off} (ms)	Duty Cycle (%)
802.11n ht40	100	100	100
802.11ac vht80	100	100	100
1.4M	100	100	100
10M	100	100	100
20M	0.592	1.000	59.2

Duty Cycle	
802.11n ht40	
802.11ac vht80	

Duty Cycle	
1.4M	
10M	
20M	

5. RF EXPOSURE EVALUATION

5.1 MAXIMUM PERMISSIBLE EXPOSURE (MPE)

5.1.1 Applicable Standard

FCC §15.247 (i) & §1.1310 & §2.1091

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. See §1.1307(b)(1) of this chapter.

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

(B) Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	**Electric Field Strength (V/m)**	**Magnetic Field Strength (A/m)**	**Power Density (mW/cm^2)**	**Averaging Time (minutes)**
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*($180/f^2$)	30
30–300	27.5	0.073	0.2	30
300–1500	/	/	f/1500	30
1500–100,000	/	/	1.0	30

f = frequency in MHz; * = Plane-wave equivalent power density;

According to §1.1310 and §2.1091 RF exposure is calculated.

5.1.2 Procedure

Prediction of power density at the distance of the applicable MPE limit
$S = PG/4\pi R^2$ = power density (in appropriate units, e.g. mW/cm^2);
P = power input to the antenna (in appropriate units, e.g., mW);
G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

5.1.3 Calculated Result

Modes	Antenna Gain		Conducted output power including Tune-up Tolerance		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
	(dBi)	(numeric)	(dBm)	(mW)			
2.4G SRD	1.1	1.29	26	398.11	20.00	0.1021	1.0
5G SRD	2.1	1.62	24	251.19	20.00	0.0811	1.0
5G Wi-Fi	2.1	1.62	8	6.31	20.00	0.0020	1.0

Note: The SRD 2.4G and 5G can`t transmit* simultaneously, *and Wi-Fi can`t transmit simultaneously *with SRD.*

Result: The device meet FCC MPE at 20 cm distance

5.2 EXEMPTION LIMITS FOR ROUTINE EVALUATION – RF EXPOSURE EVALUATION

5.2.1 Applicable Standard

RSS-102 § (2.5.2):

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

- below 20 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (adjusted for tune-up tolerance);
- at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $4.49/f^{0.5}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);
- at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2} f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).

In these cases, the information contained in the RF exposure technical brief may be limited to information that demonstrates how the e.i.r.p. was derived.

5.2.2 Calculated Result

Mode	Antenna Gain	Conducted output power including Tune-up Tolerance	EIRP		Exemption limits (mW)	Exemption
	(dBi)	(dBm)	(dBm)	(mW)		
2.4G SRD	1.1	26	27.1	513	2678	Yes
5G SRD	2.1	24	26.1	407	4510	Yes
5G Wi-Fi	2.1	8	10.1	10	4531	Yes

Note: The SRD 2.4G and 5G can`t transmit* simultaneously*, and Wi-Fi can`t transmit simultaneously *with SRD.*

Result: Compliance. The device is compliance exemption from Routine Evaluation Limits –RF exposure Evaluation.

******* END OF REPORT *******